TASCAM

TEAC Professional Division

SERVICE MANUAL

DA-P20

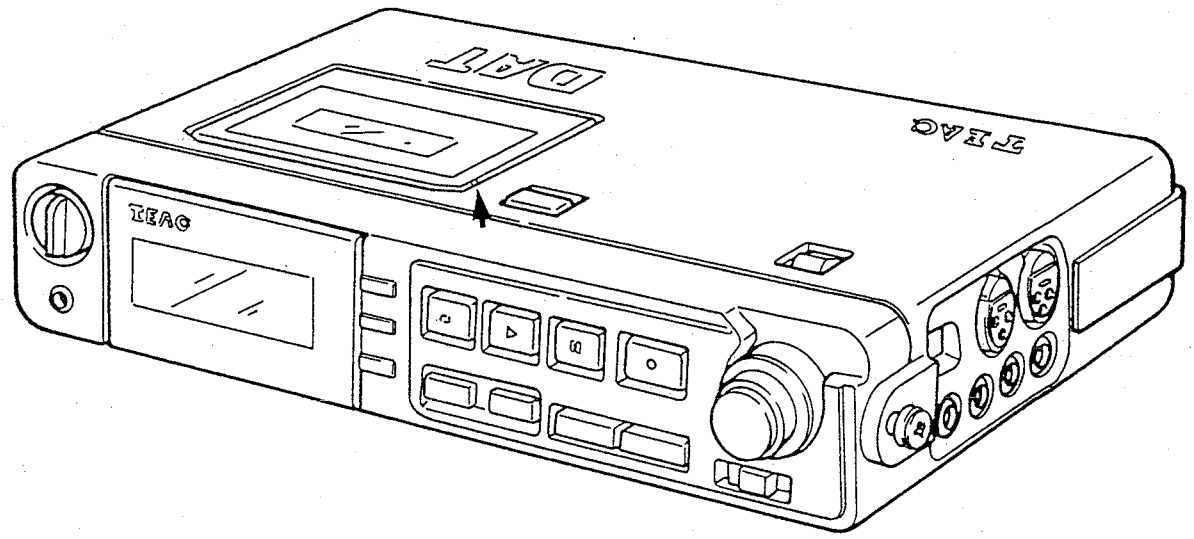
Digital Audio Tape Deck

INSTRUCTIONS FOR SERVICE PERSONNEL

BEFORE RETURNING APPLICANCE TO THE CUSTOMER, MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

Caution : This unit cannot be disassembled without lifting cassette cover.

Insert a thin rod in the small hole (pointed by an arrow in the figure) and push.



CONTENTS

1. SCHEMATIC DIAGRAM
   - 1-1. CN PCB Ass'y 1
   - 1-2. Main PCB Ass'y (LOGIC) 2
   - 1-3. Main PCB Ass'y (Audio) 3
   - 1-4. Main PCB Ass'y (Motor Drive) 4
   - 1-5. Main PCB Ass'y (POWER SUPPLY) 5
   - 1-6. Main PCB Ass'y (Digital Interface) 6
   - 1-7. ATF PCB Ass'y 7
   - 1-8. PRE PCB Ass'y 8
   - 1-9. SUB PCB Ass'y 9
   - 1-10. HP PCB Ass'y 10

2. PCB VIEWS & MAJOR WAVEFORM
   - 2-1. Main PCB 11
   - 2-2. SUB PCB, ATF PCB, PRE PCB, HP PCB, CN PCB 12
   - 2-3. Major Waveforms 13

3. BLOCK DIAGRAM FOR DA-P20 14

4. LSI FUNCTIONS
   - 4-1. Main CPU A (HD62004A) and B (HD62014A) 16
   - 4-2. Micro-computer (μPD75312) terminal function 23
   - 4-3. Digital I/O and Audio Interface (TC110G08AF) 25

5. IC BLOCK DIAGRAM
   - 5-1. Data Strobe IC (HA12109) 29
   - 5-2. Head Amp. (HA11851MP) 30
   - 5-3. Digital to Analog Converter (PCM55HP) 31
   - 5-4. RAM (HM65256BLFP) 31
   - 5-5. Loading Motor Driver (M54649) 32
   - 5-6. Cylinder Motor Driver (HA13403MP) 33
   - 5-7. Capstan Motor Driver (HA13403) 34
   - 5-8. Multiplexer (μPD4053) 34
   - 5-9. Voltage Regulators (M5236ML) 34
   - 5-10. Voltage Regulators (S81250HG) 34

6. MICROCOMPUTER INTERFACE 35

7. SERVO SYSTEM
- 7-1. ATF Servo 37
- 7-2. Cylinder Servo 39
- 7-3. Capstan Servo 40
- 7-4. Motor Control 41

8. D/A • A/D CONVERTER BLOCK 42

9. ADJUSTMENTS
- 9-1. VDD Voltage Adjustment 43
- 9-2. Linearity Adjustment 44
- 9-3. Cylinder and Clock pulse synchronism 45
- 9-4. PLL Adjustment 46
- 9-5. REC Level 46
- 9-6. Error Rate 47

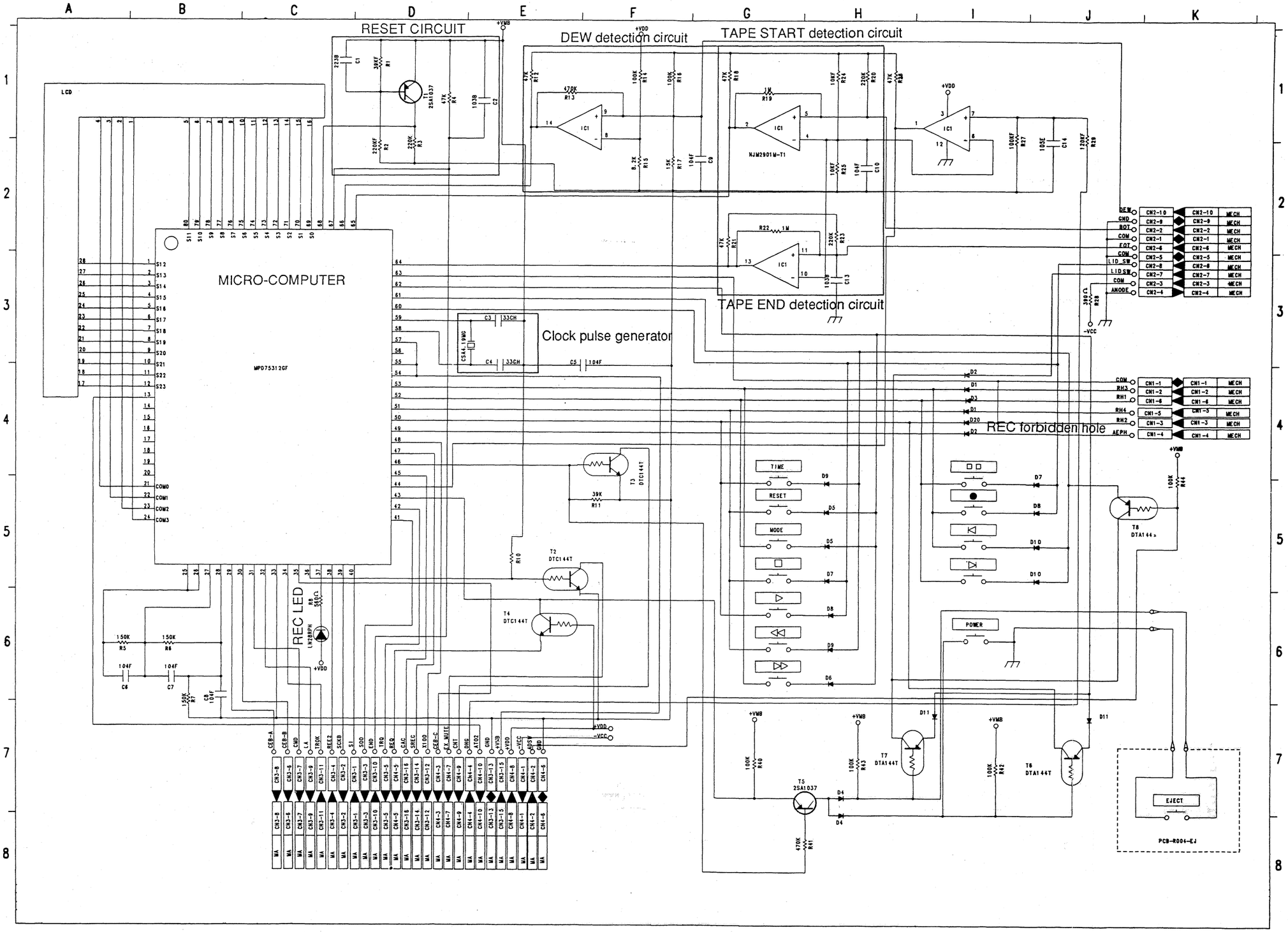
10. SCMS (Serial Copy Management System) 48

11. PARTS LIST 54

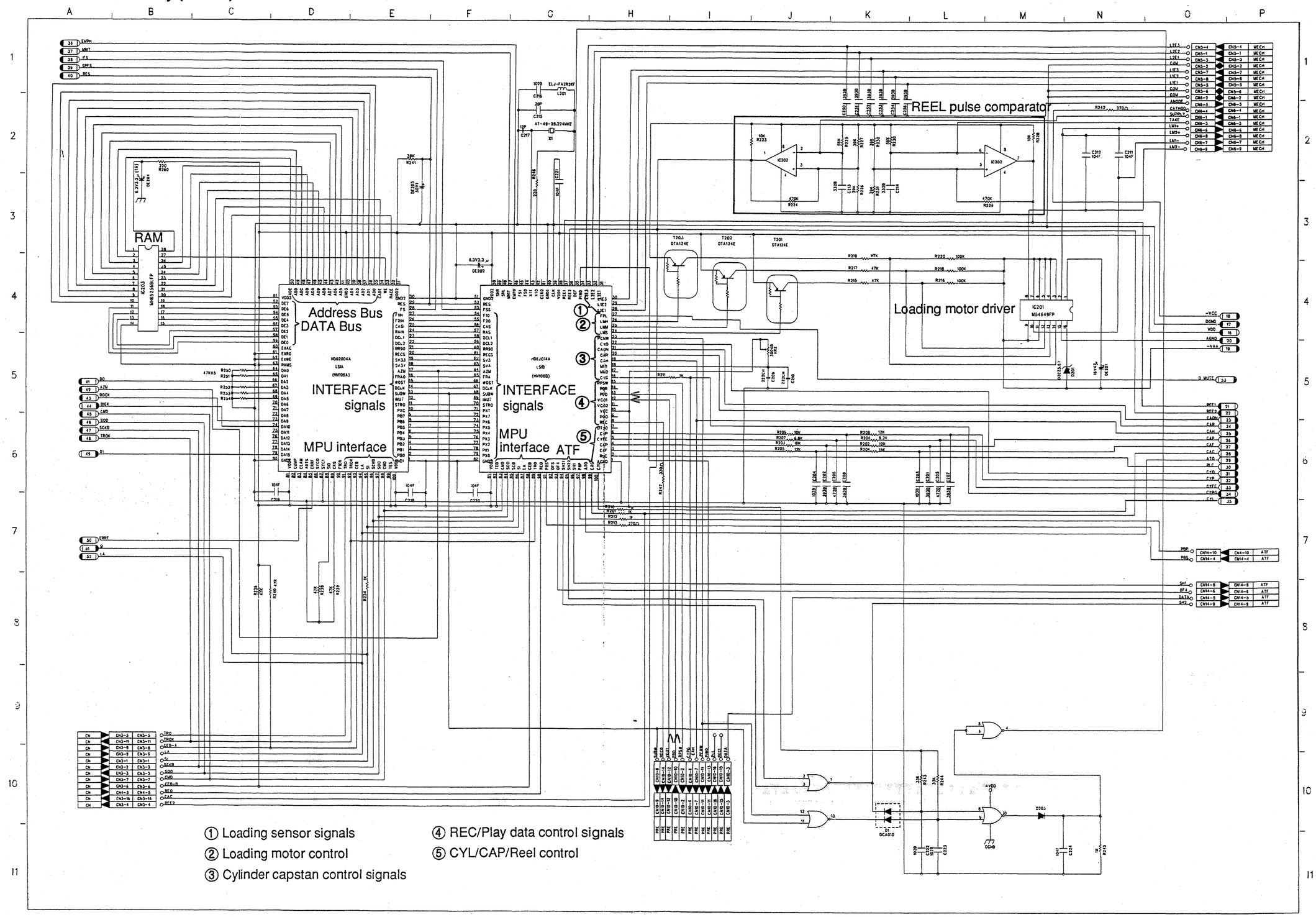
12. DAT MECHANICAL PARTS LIST 67

1. SCHEMATIC DIAGRAM

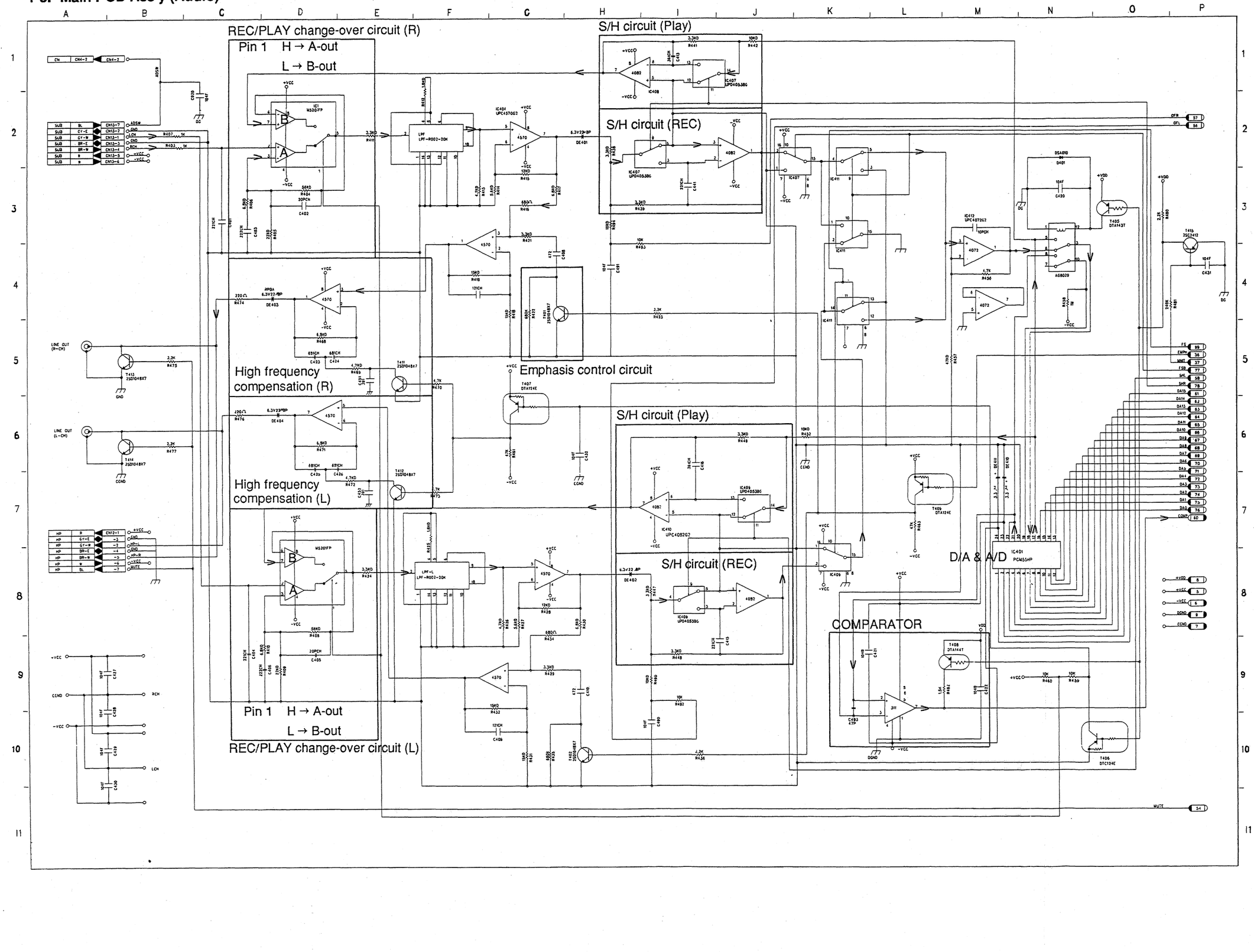
1-1. CN PCB Ass'y



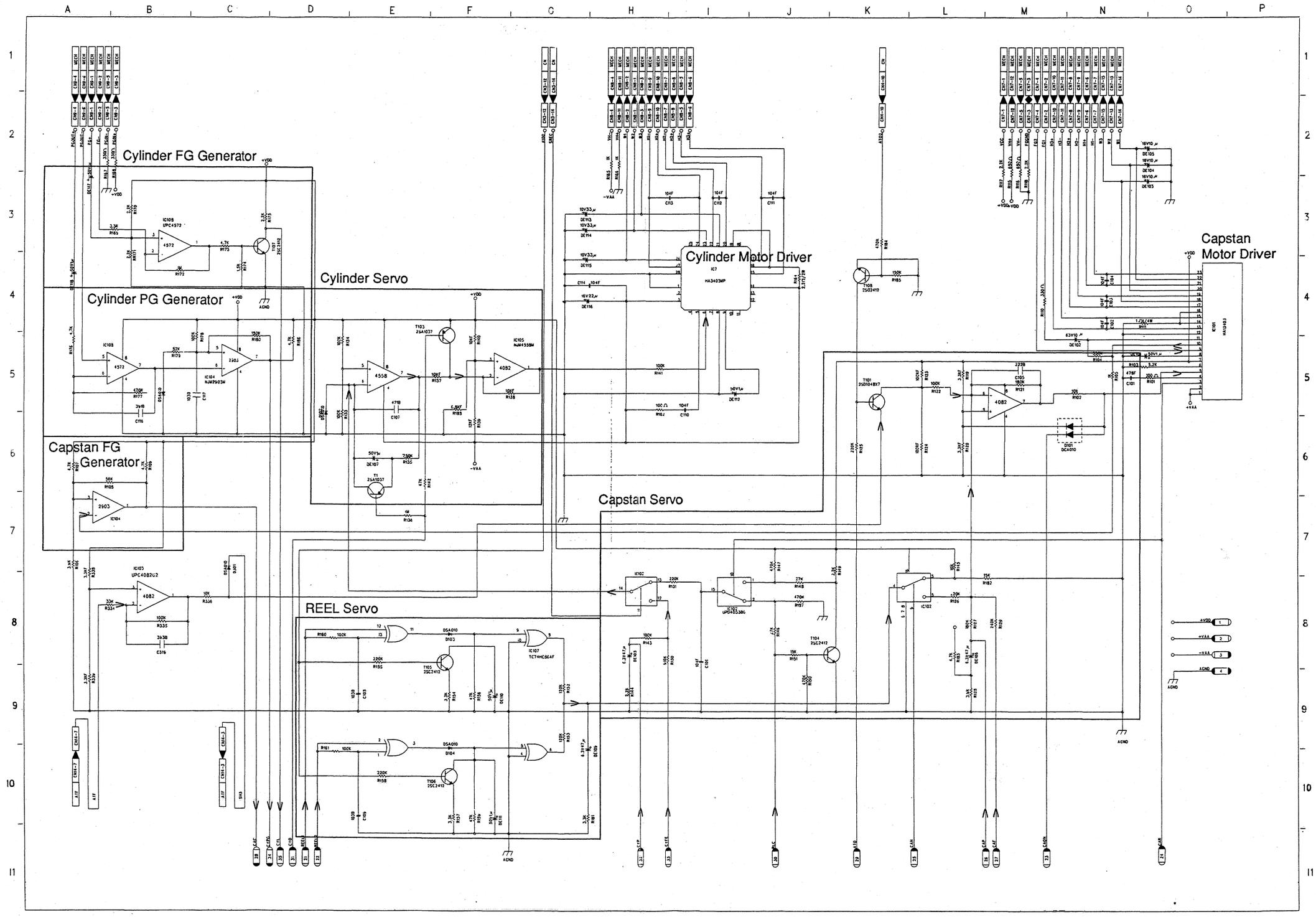
1-2. Main PCB Ass'y (LOGIC)



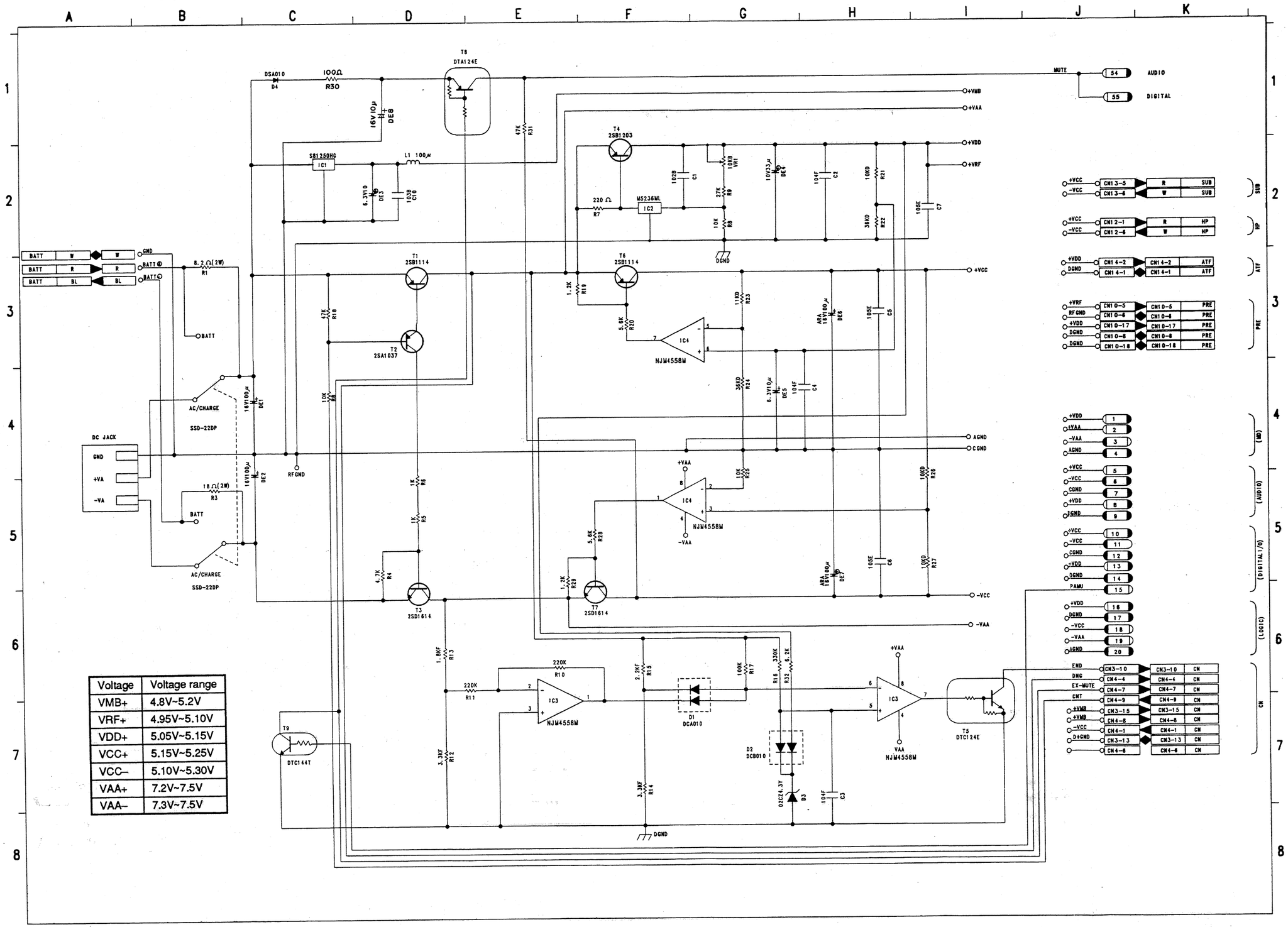
1-3. Main PCB Ass'y (Audio)



1-4. Main PCB Ass'y (Motor Drive)

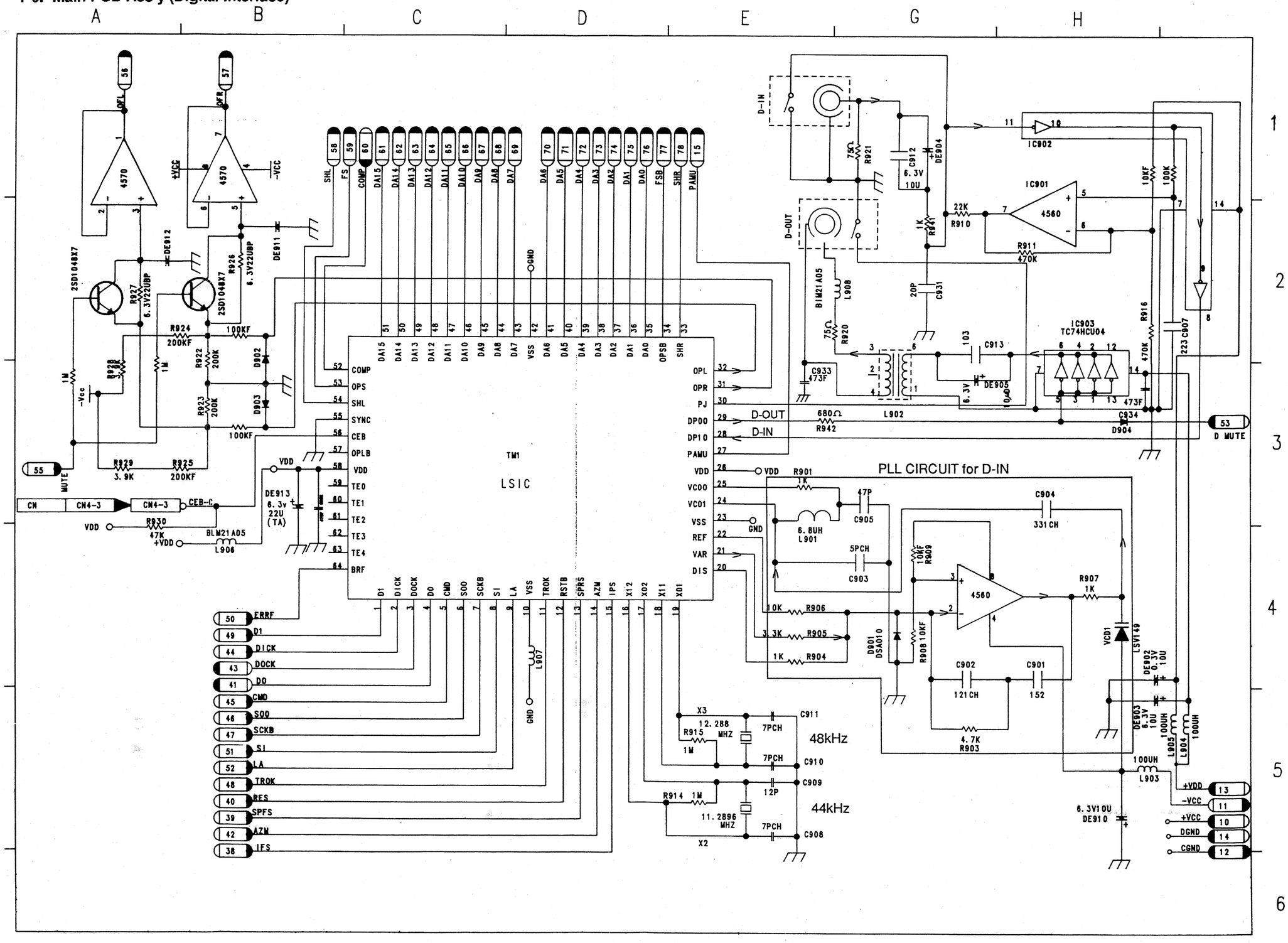


1-5. Main PCB Ass'y (POWER SUPPLY)

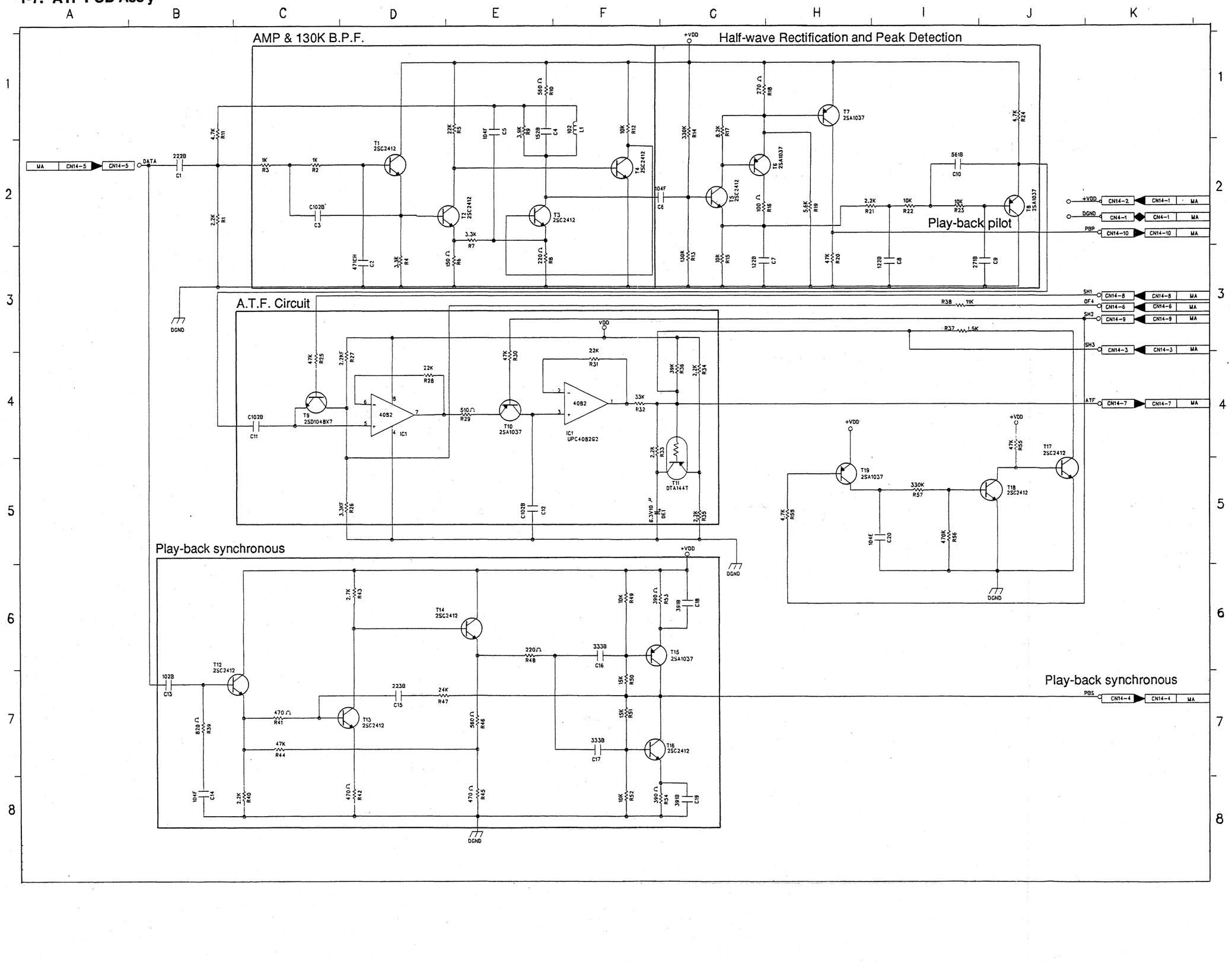


Voltage	Voltage range
VMB+	4.8V~5.2V
VRF+	4.95V~5.10V
VDD+	5.05V~5.15V
VCC+	5.15V~5.25V
VCC–	5.10V~5.30V
VAA+	7.2V~7.5V
VAA–	7.3V~7.5V

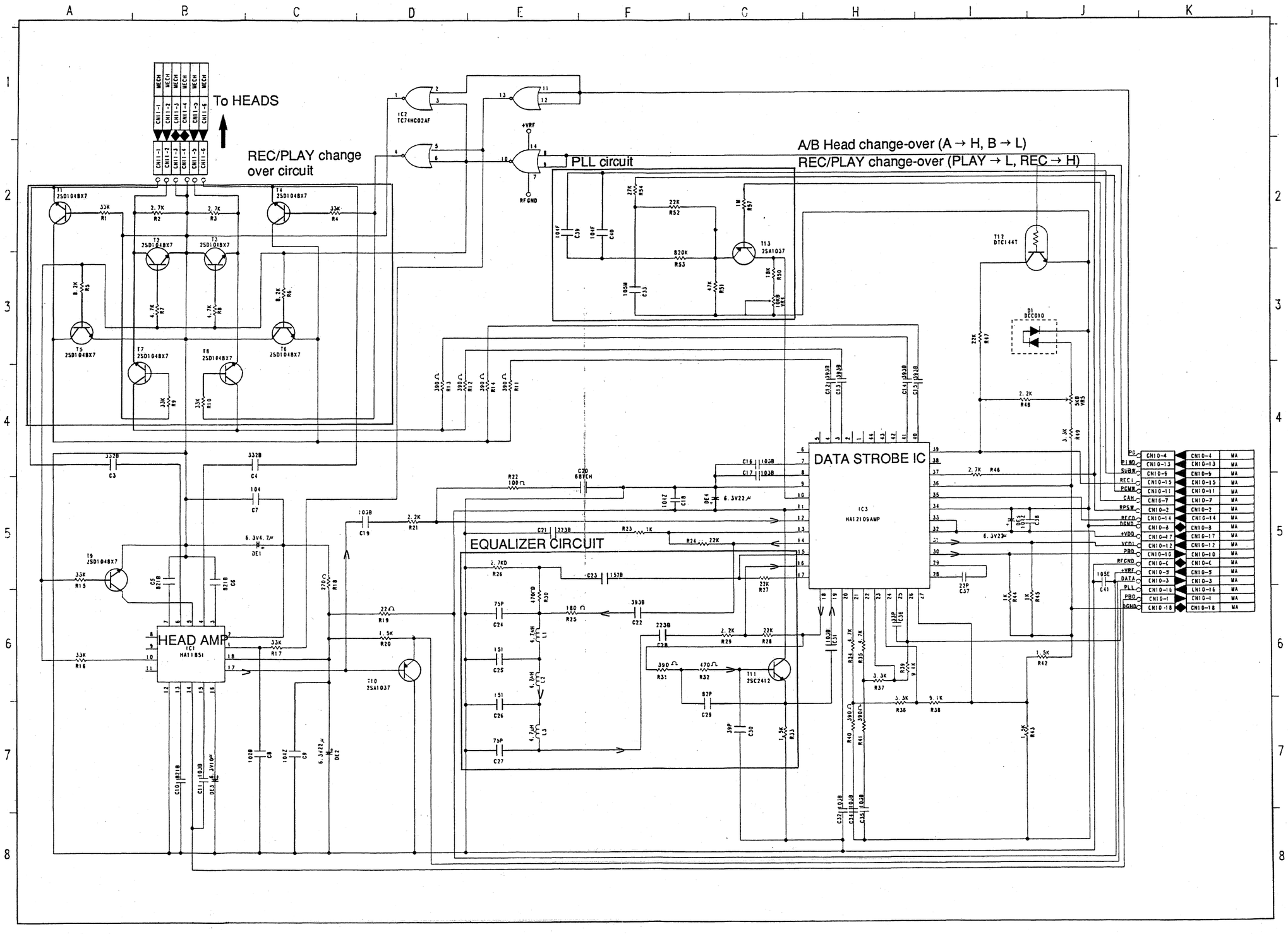
1-6. Main PCB Ass'y (Digital Interface)



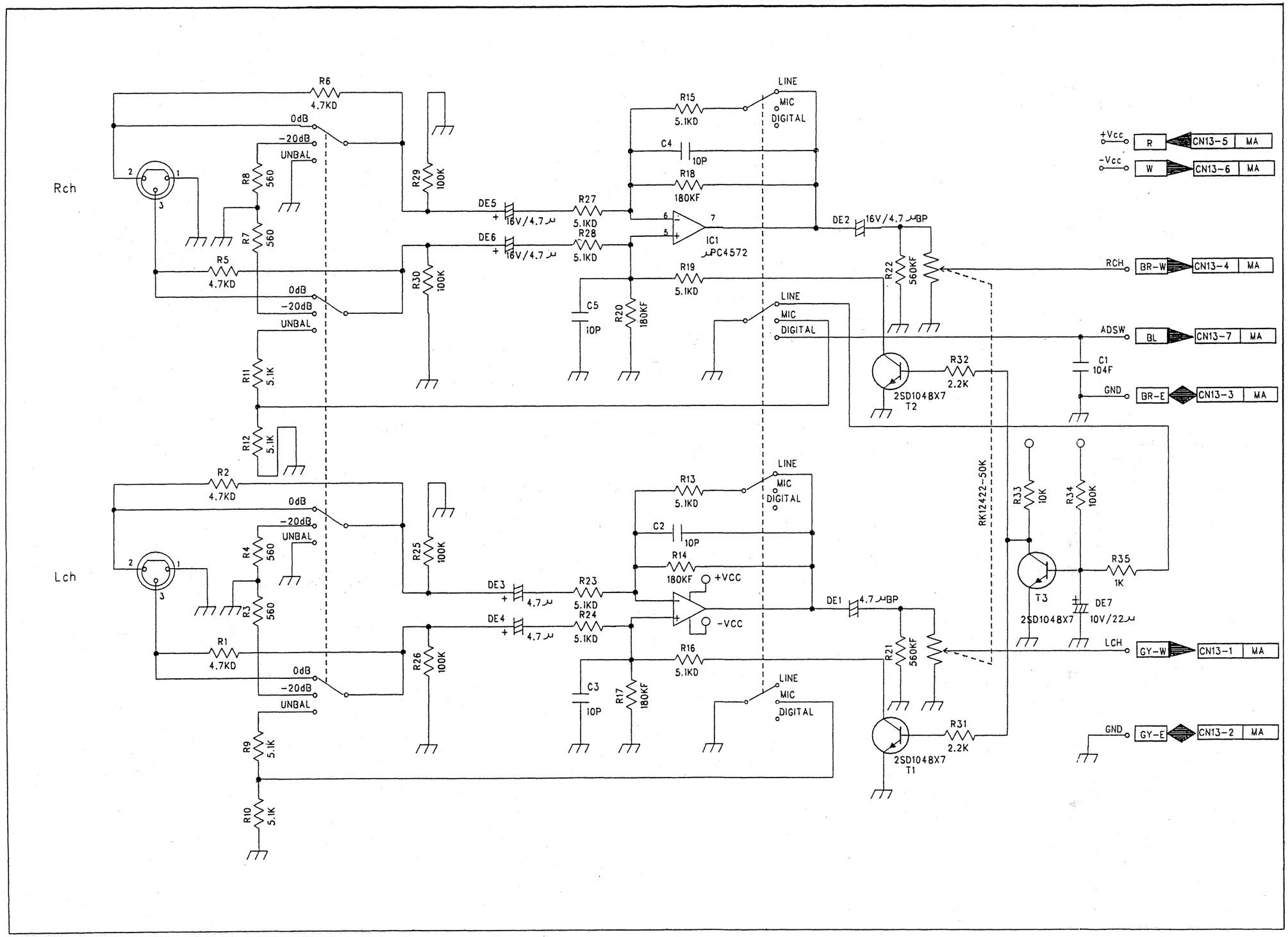
1-7. ATF PCB Ass'y



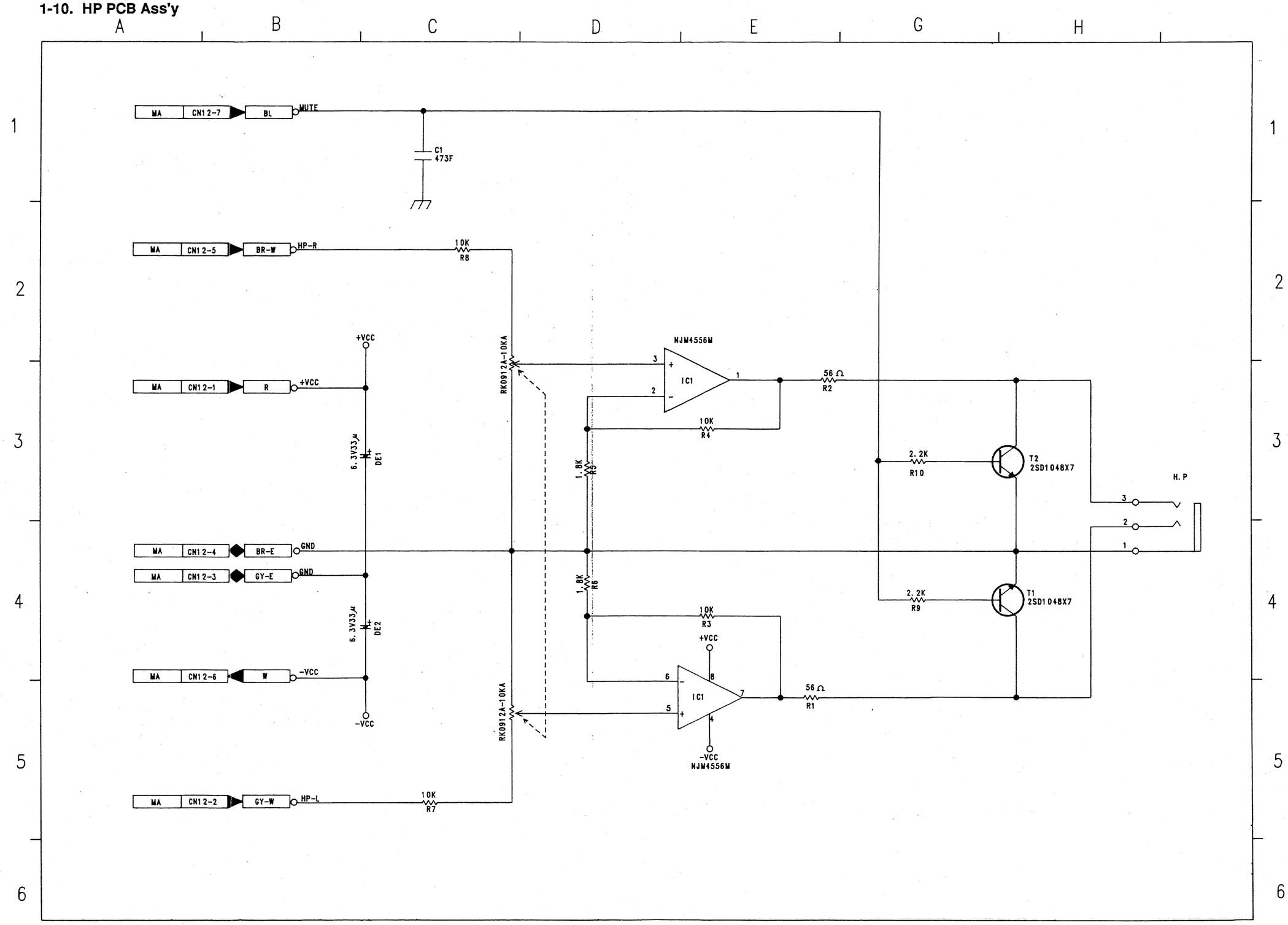
1-8. PRE PCB Ass'y



1-9. SUB PCB Ass'y

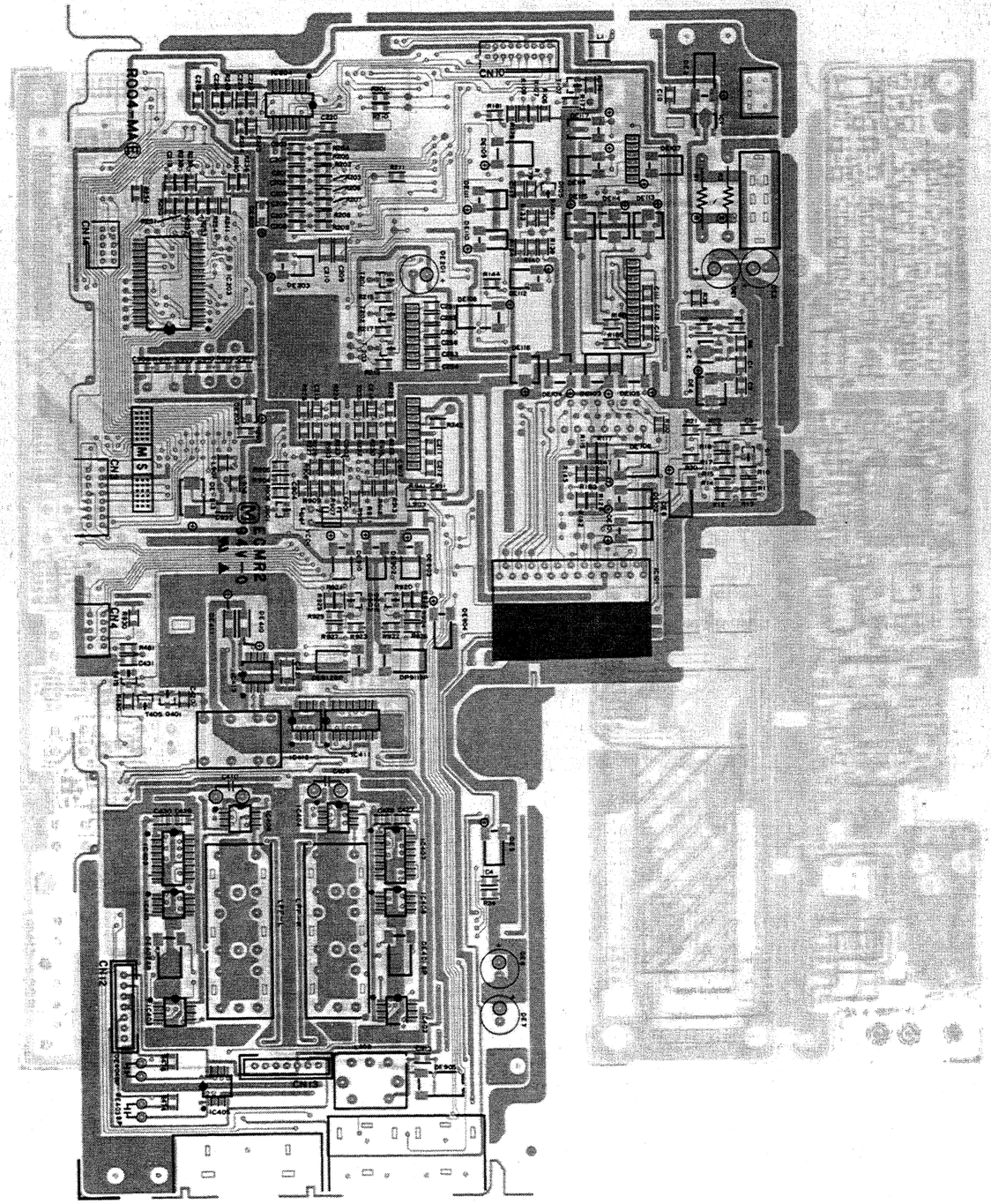


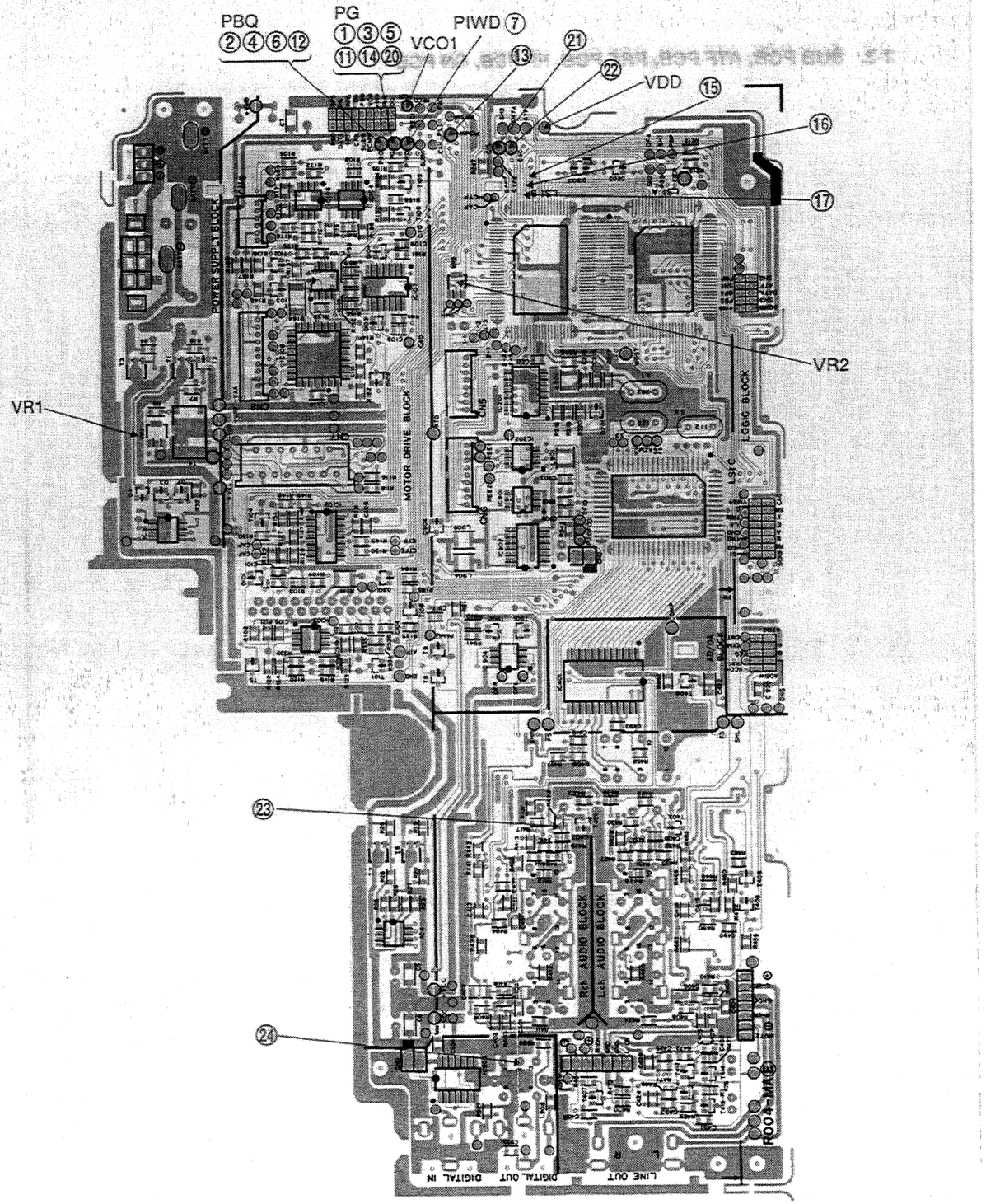
1-10. HP PCB Ass'y



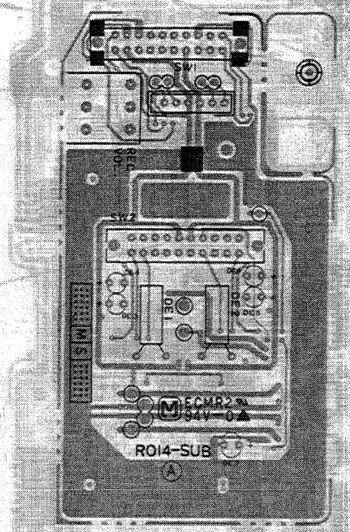
2. PCB VIEWS & MAJOR WAVEFORM

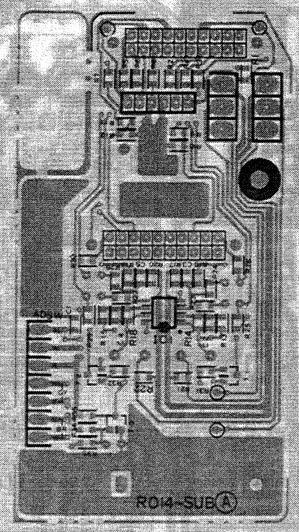
2-1. Main PCB

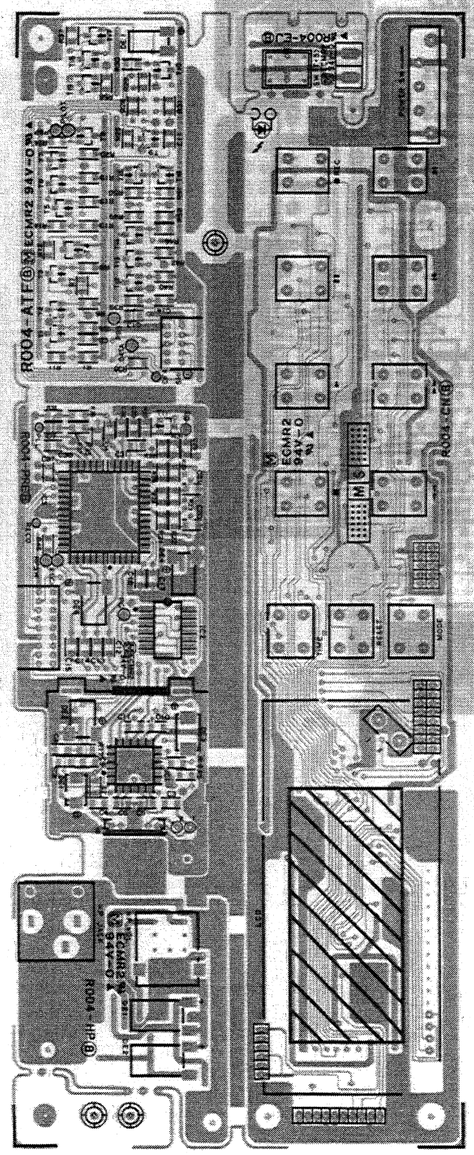


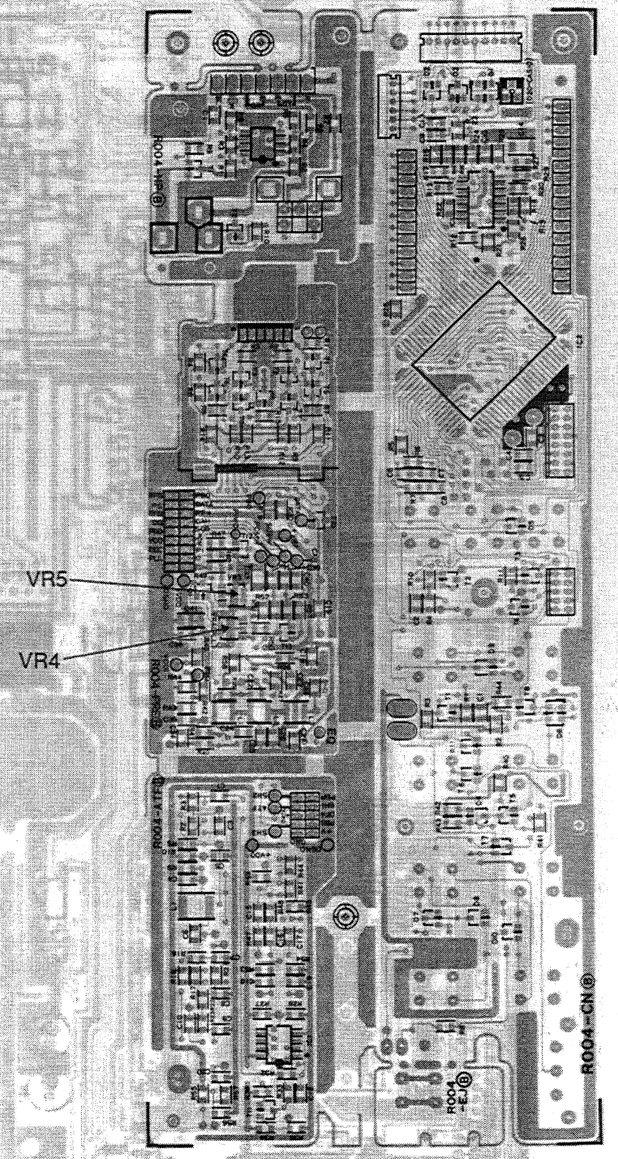


2-2. SUB PCB, ATF PCB, PRE PCB, HP PCB, CN PCB

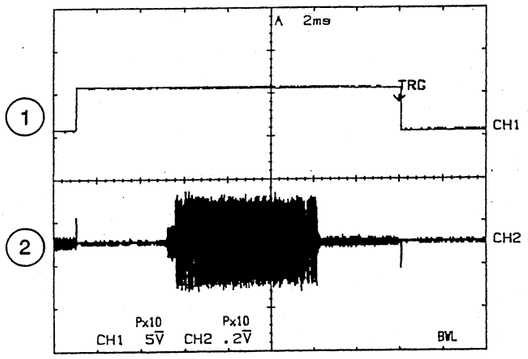




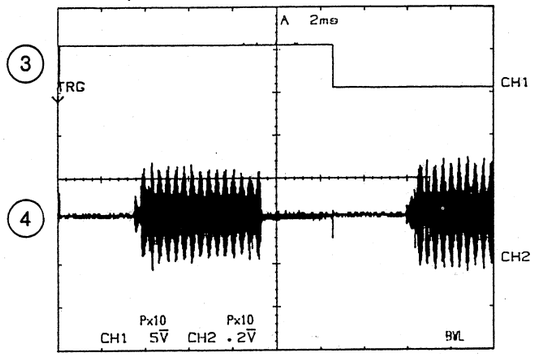




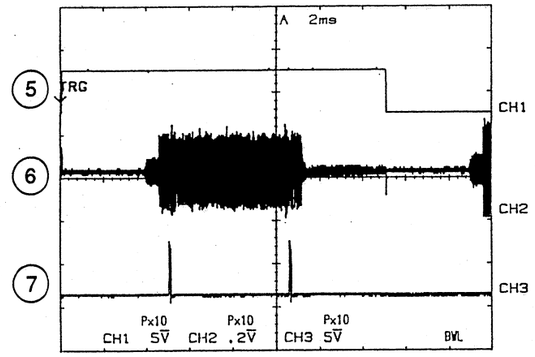
2-3. Major Waveforms



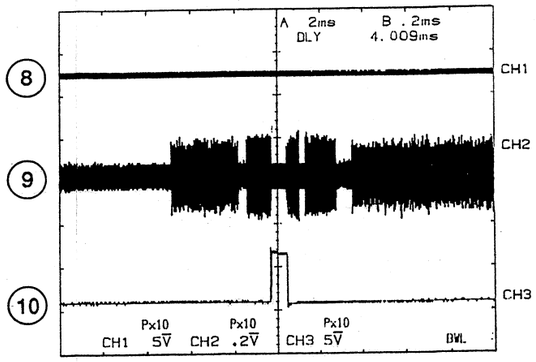
① Test Pad PG
② Test Pad PBO
(During play)



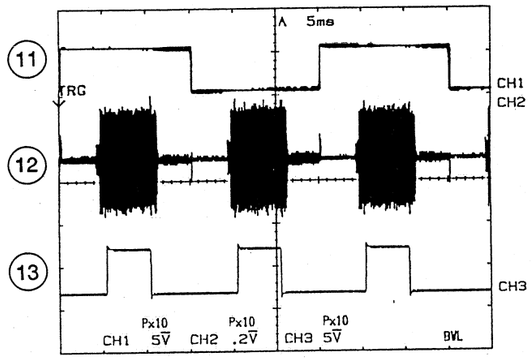
③ Test Pad PG
④ Test Pad PBO
(During FF)



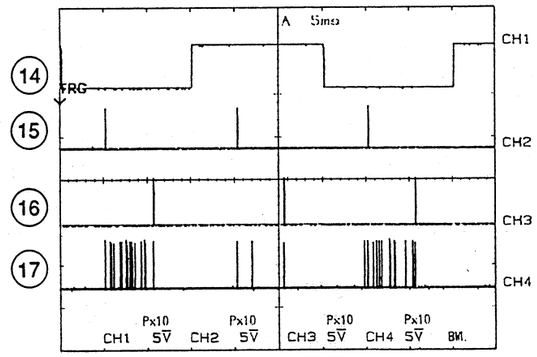
⑤ Test Pad PG
⑥ Test Pad PBO
⑦ Test Pad PIWD
(During play of test tape TY-7551)



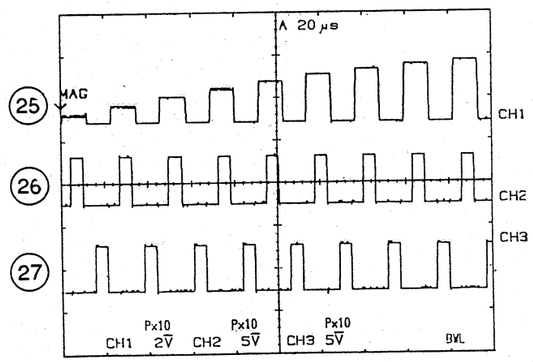
⑧, ⑨, ⑩ are expansion diagram of ⑤, ⑥, ⑦
(Delay trigger, B trigger area of PIWD)



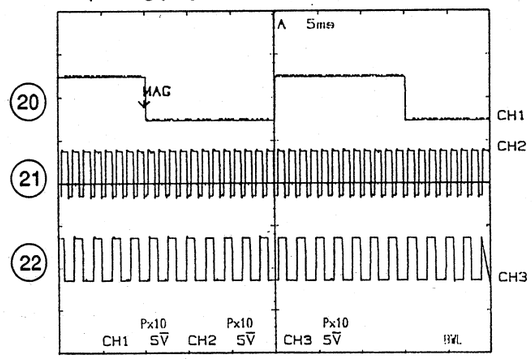
⑪ Test Pad PG
⑫ Test Pad PBO
⑬ Test Pad PCMW
REC Vol - MIN during REC



⑭ Test pad PG
⑮ SH21 (HD62014A-94-pin)
⑯ SH22 (HD62014A-95-pin)
⑰ SH1 (HD62014A-96-pin)

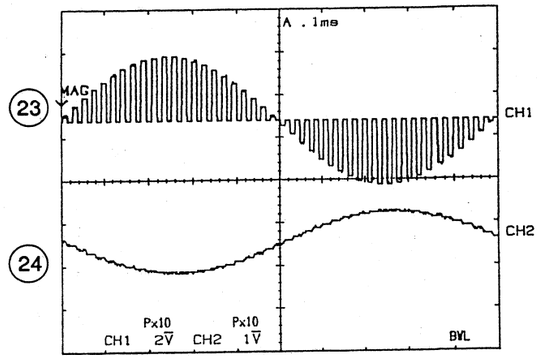


(During expansion of ㉔ and ㉓, time axis from o.'ms to 20μs)
㉖ SHL (HD62014-48-pin)
㉗ SHR (HD62014-49-pin)
Sampling pulse (L&R) of sample hold circuit



⑳ Test Pad PG Cylinder PG
㉑ Test Pad CYL Cylinder FG
㉒ Test Pad CAC Capstan FG

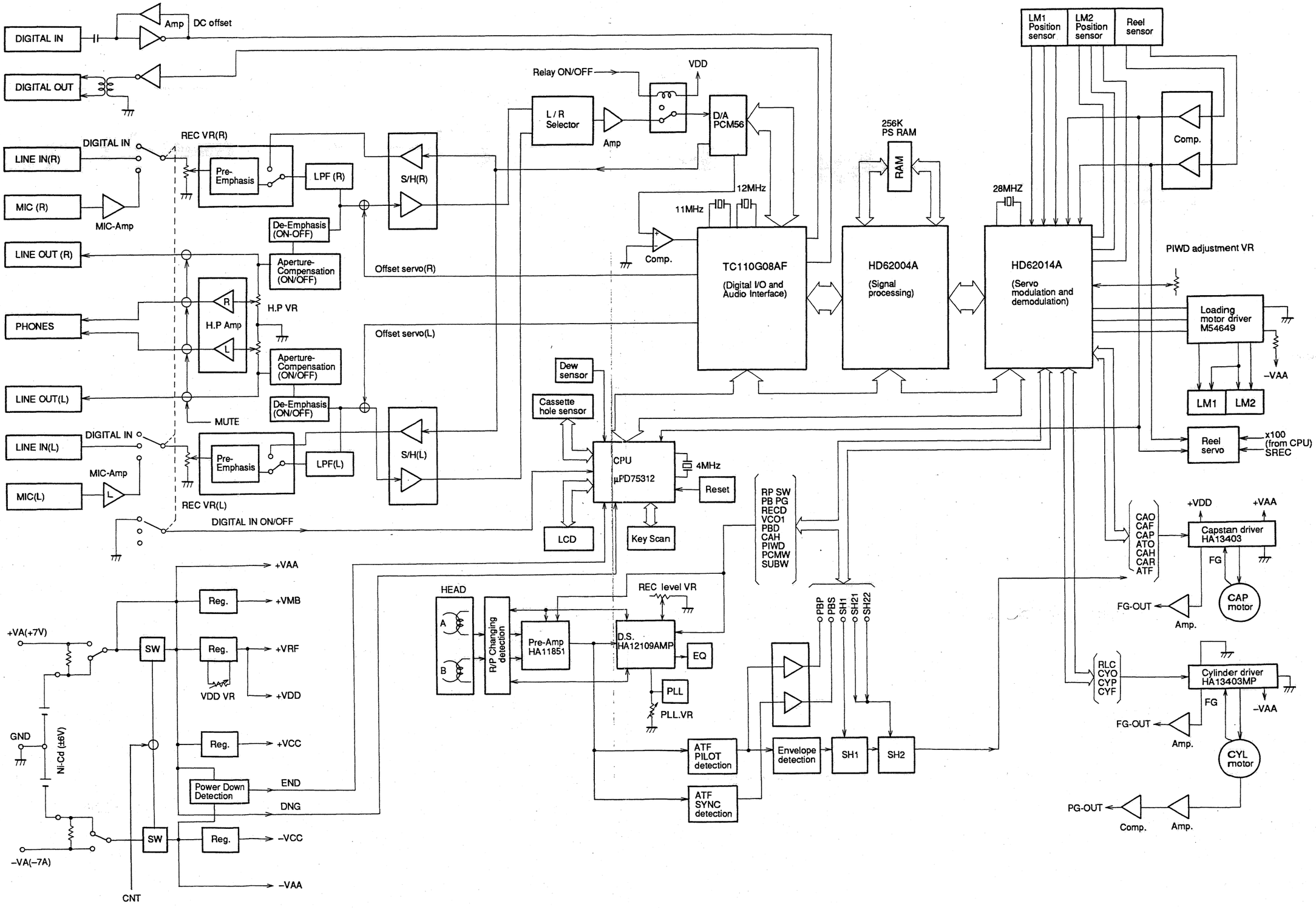
(Note) Since the servo has a strong effect on the CYC (cylinder FG), the wave form moves.



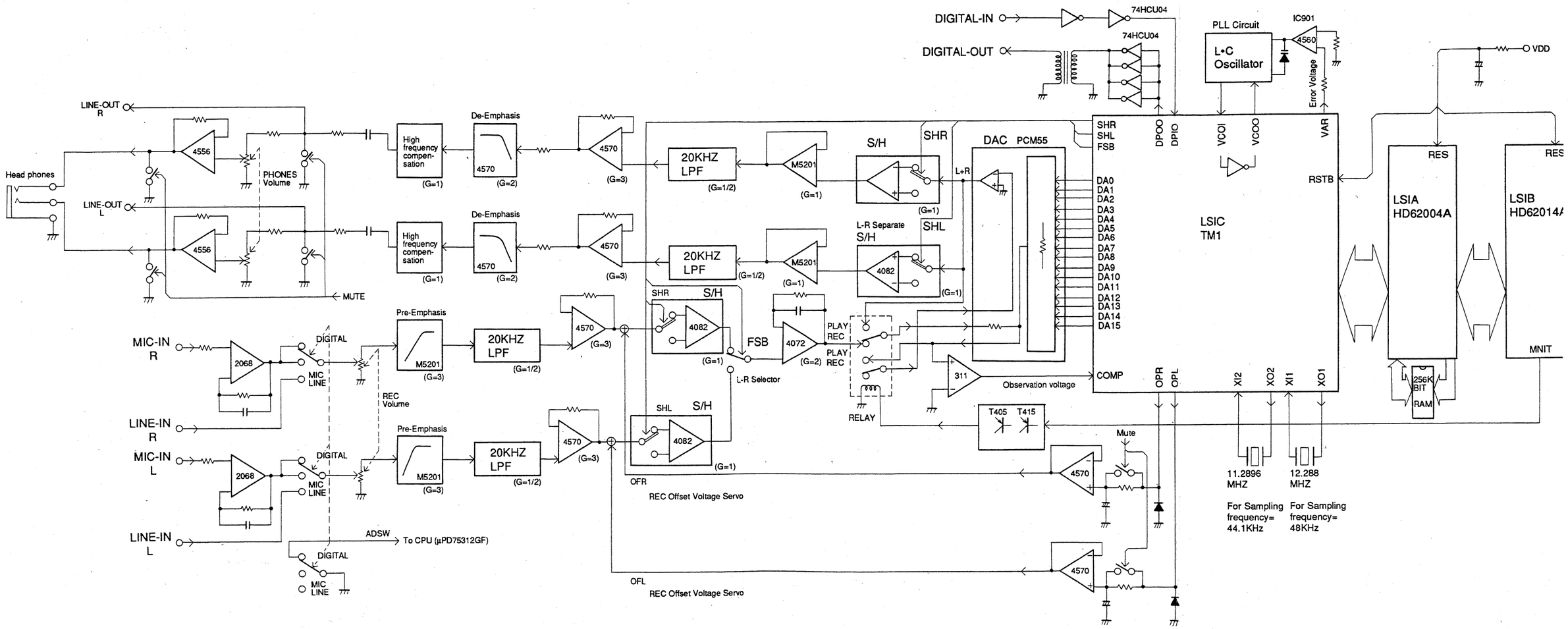
㉓ D/A convertor out (R442)
㉔ LPF-R IN (2-pin of LPF-R002-20K)

(During the play of Pno9
[1kHz R→0db / L→silent] of test tape TY-7551)

3. BLOCK DIAGRAM FOR DA-P20



Block Diagram for DA-P20 (Audio-Signal INPUT/OUTPUT)



4. LSI FUNCTIONS

4-1. Main CPU A (HD62004A) and B (HD62014A)

Outline

Both DAT signal processing and servo control are carried out by combining together two units, HD62004 and HD62014.

Features

Signal processing unit

1. 8 ~ 10 modulation/demodulation
2. Double Read-Solomon, corrected and generated
   a. C1 max. double correction
      C2 max. sextuplex correction
   b. State of error correction, possible to be monitored.
3. Sub-code processing
   Data, reproducible for ID and Pack even during search.
4. System, possible to be composed for 3 kinds of Fs (Sampling Frequency)
   a. 48K 16 bit 2 ch
   b. 44.1K 16 bit 2 ch (Playback only)
5. Sub-code unit, capable of after-recording
6. One type of crystal (28.224MHz) can put the whole system in operation.

AD/DA Interface

1. Both DA (Digital to Analog) and AD (Analog to Digital) operations are posible by means of a high speed DA converter and a comparator because of a sequential comparator circuit logic unit enclosed.
2. Even serial type AD and DA can be composed because of provision of a serial interface.

Microcomputer Interface

Capable of exchanging various sorts of information with a microcomputer via a serial interface.

a. Various system control signals
b. Sub-code data
c. Max. value of PCM (Pulse Code Modulation) inside one frame (used for level meter).
d. I/O value at general purpose port
e. Measured value of reel pulse

Servo Unit

1. ATF (Automatic Track Finding) unit
   a. Detects synchronization and generates signals SH1, SH2
   b. Generates offset signal by means of above detection and error rate.
2. Cylinder servo unit
   a. FG . . . . 800 Hz
   b. PG . . . . . 33 Hz (correction circuit by monostable multivibrator)
3. Capstan servo unit
   a. FG 468Hz, 400Hz
   b. PG . . . . . carried out by dividing FG during recording operation.
4. Reel servo
   To control relative speed between the cylinder and the reel by using 130KHz pilot signal.

Name and function of each terminal

HD62004

- Controls D/A or A/D conversion
- Data correction
- Sub-code control
- Provides various timing signals

Pin No.	Terminal name	Type	Connected to	Function	
1	GND1		GND		
2 ~ 9	PB0~PB7	I/O	HD62014	Data bus between HD62004 and HD62014.	
10	PXC	IN		Signal to determine the direction of PB0 ~ 7. H . . . Out L . . . In	
11	STRQ	IN		Synchronous signal for recording	
12	IMUT	OUT		Monitor in state of error mute L . . . Mute	
13	SUBW	IN		Sub-code area write signal (after-recording timing)	
14	DCLK	IN		Playback data synchronous signal	
15	WOST	IN		Playbacked block synchronous detecting signal	
16	FRA0	OUT		Timing signals of various frequencies.	15 Hz
17	AZM				33 Hz
18	SV3Y				33 Hz
19	SV33				33 Hz
20	RECS	OUT		System, in recording/playback state L. . . during playback H. . . during recording	
21	R90	OUT		66 Hz timing signal	
22	DCL2	IN		System clock pulse	4.7 MHz
23	DCL1				4.7 MHz
24	RAIN				2.3 MHz
25	CASI				2.3 MHz
26	F2IN				2.3 MHz
27	F1IN				2.3 MHz
28	FS	IN		Sampling clock 48 k/44.1k/32kHz	
29	RES	IN		Reset input terminal, Low active.	

Pin No.	Terminal name	Type	Connected to	Function	
30	GND		GND		
31	VDD2		+5V		
32	RACE	OUT	RAM	$\overline{CE}$ signal of RAM, output	
33	WE	OUT		$\overline{WE}$ signal of RAM, output	
34	CAOE	OUT		$\overline{OE}$ signal of RAM, output	
35 ~ 39	AD0~AD4	OUT		Address signal of RAM, output AD0 ~ AD4	
40	GND3		GND		
41~50	AD5~AD14	OUT	RAM	Address signal of RAM, AD5 ~ AD14	
51	VDD3		+5V		
52 ~ 59	DE7 ~ DE0	I/O	RAM	Data bus of RAM	
60	EXAC	OUT		Terminal for testing (No used)	
61	EXRZ	IN	GND		
62	EXWE	IN	GND		
63	RAMS	IN	5V		
64	DA0	I/O	DAC and ADC	MSB	GND (serial mode)
65	DA1	I/O			GND
66	DA2	I/O			AD data, input (2's comp.)
67	DA3	I/O			GND
68	DA4	I/O			GND
69	DA5	I/O			NC
70	DA6	I/O		DAC data output	NC
71	DA7	I/O		(offset binary)	NC
72	DA8	I/O			NC
73	DA9	I/O			BCK for AD
74	DA10	OUT			BCK for DA
75	DA11	OUT			WCLK for DA
76	DA12	OUT			Latch clock for DA
77	DA13	OUT			CC for DA
78	DA14	OUT			LRCK for DA

Pin No.	Terminal name	Type	Connected to	Function
79	DA15	OUT		LSB DATGA for DA, output
80	GND4		GND	
81	VDD4		5V	
82	COMP	IN	Comparator	Comparator input for sequential comparison
83	CLAM	OUT	Clamp circuit	Serial digital signal output from built-in ADC (No used)
84	ADTS	OUT		For testing (No used)
85	ERRF	OUT		DA interpolation state monitor terminal (No used) H . . . interpolation
86	STCO	OUT		For testing (No used)
87	SYCI	IN		GND
88	SIO	I/O		Pull down
89	CSK	I/O		Pull down
90	F1ER	OUT		Error correcting monitor terminal. When an error is occurd, a pulse is provided.
91	TRQ	OUT	Microcomputer	Microcomputer data transport demand
92	TROK	IN		Microcomputer transport mode (Acknowledge signal)
93	CEB	IN		Chip enable for microcomputer I/F
94	LA	IN		Latch clock for microcomputer I/F
95	SI	IN		Serial data input for microcomputer I/F
96	SCKB	IN		Serial clock input for microcomputer I/F
97	SOO	OUT		Serial data output for microcomputer I/F
98	CMD	IN		DATA synchronous signal for microcomputer I/F
99	TES	IN		Testing terminal (No used)
100	VDD1		+5V	

HD62014

- Servo controls for capstan, reel, and cylinder
- Provides various timing pulses

Pin No.	Terminal name	Type	Connected to	Function
1	AGND		GND	GND for 2 pin ~ 9 pin buffer
2	RLC	OUT	Reel driver	PWM (Pulse Width Modulation) signal for reel control, output during search
3	CAF	OUT	Capstan driver	PWM signal, output by capstan frequency error, output
4	CAP	OUT	Capstan driver	Capstan phase error, output (PWM output signal)
5	CYFE	OUT	Cylinder driver	Cylinder frequency error, output (PWM output signal)
6	CYP	OUT	Cylinder driver	Cylinder phase error, output (PWM output signal)
7	DT50	OUT		Clock of duty 50% output (No used)
8	REC	OUT	Rec. Amp.	Recorded data, output (high impedance, except recording period)
9	PDO	OUT	VCO	Phase comparison between playbacked data and extracted clock, output (No used)
10	VCC			Power supply for 2 ~ 9 pin buffer
11	VC02	OUT	VCO	VCO clock: output (9.408/18.816 MHz)
12	VC01	IN		VCO clock: input clock (clock signal for playback)
13	PBD	IN	Reproducing Amp.	Playbacked data: Input
14	PBR	OUT		Playbacked data: Output
15	RPSW	OUT	Rec. Amp	REC/PLYA chagne-over signal REC . . . High PLAY. . . Low
16	CYG	IN	Cylinder PG	Cylinder PG (Pulse Generator) input terminal
17	MM2	IN	Monostable multivibrator	Monostable multivibrator delay monitor terminal (No used)
18	MM1			Monostable multivibrator C/R integral input terminal for control of cylinder phase
19	CAH	OUT		During search . . . H

Pin No.	Terminal name	Type	Connected to	Function
20	CAR	OUT		Capstan { FF . . . L / RW . . . H
21	CAON	OUT		Capstan motor ON signal
22	CYO	OUT		Cylinder motor ON signal
23	PCMW	OUT		During search — relative speed between cylinder and reel Other time — window output of PCM area
24	LMS			
25	LMM	OUT		Loading motor control signals
26	LMH			
27	FPL			
28	L1E1	IN		Loading motor sensor signals
29	L1E2			
30	L1E3			
31	L2E1			
32	L2E2			
33	L2E3			
34	PIWD	OUT		Window pulse output of Pilot area
35	DCF	IN		General purpose input port (No used)
36	REE2	IN	Reel pulse	Reel pulse input (supply)
37	REE1	IN		Reel pulse input (take up)
38	VDD1		+5V	
39	CLK	IN		For testing (No used)
40	GND		GND	
41	CLKO	OUT		Master clock, divided into 1/3 (No used)
42	XTO	OUT	Crystal	Master clock oscillator 28.224 MHz
43	XTI	IN		

Pin No.	Terminal name	Type	Connected to	Function	
44	FS0	OUT		Sampling frequency mode output	
45	FS1	OUT			
46	EMPH	OUT		Change-over signal for emphasis ON/OFF	
47	MN1T	OUT		Change-over signal for REC/PLAY	
48	SHL	OUT	DAC and ADC	Sample hold pulse for D/A, A/D	Left
49	SHR	OUT			Right
50	VDD2		+5V		
51	GND2		GND		
52	RSE	IN	Reset input	Reset input terminal. Low active.	
53	FSS	OUT	HD62004	Sampling frequency clock output	
54	F10		HD62004	Basic clock	
55	F20				
56	CAS	OUT			
57	RAS				
58	DCL1				
59	DCL2				
60	RR90	IN	HD62004	Refer to HD62004	
61	RECS				
62	SV3				
63	SVA				
64	AZM				
65	FRA				
66	WOST	OUT			
67	DCLK				
68	SUBW				
69	IMUT	IN			

Pin No.	Terminal name	Type	Connected to	Function
70	STRQ	OUT	HD62004	Refer to HD62004
71	PXC			
72~79	PX ~PX0	I/O		
80	GND3		GND	
81	VDD3		+5V	
82	TEB			Test terminal +5V (No used)
83	CMD	IN	Microcomputer	Microcomputer I/F for data synchronizing
84	SOO	OUT		Serial data output
85	SCB	IN		Serial clock
86	SI	IN		Serial data input
87	LA	IN		Data latch clock
88	CEB	IN		Chip enable
89	TRQ	IN		Transport mode
90	REQ	OUT		Transport demand signal
91	PBS	IN	ATF	ATF synchronous input
92	OFS	OUT		Pulse is output when no synchronization is detected.
93	OF4	OUT		"H" during after-recording or recording. Used for offset of ATF.
94	SH21	OUT		ATF sample hold, 2 (first half)
95	SH22			ATF sample hold, 2 (last half)
96	SH1			ATF sample hold, 1
97	PBP	IN		ATF pilot input
98	ATO	OUT		Set "H" when ATF is ON.
99	CAC	IN	Capstan FG	Capstan FG input (468 Hz or 400 Hz)
100	CYL	IN	Cylinder FG	Cylinder FG input (800 Hz)

4-2. Micro-computer (μPD75312) terminal function

Function
- DA-P20 system control
- LCD display control
- Scan by console SW
- Cassette hole detection, start/end position detection

Pin No.	Terminal name	Type	Connected to	Function
1~12	S12~S23	O	LCD	LCD segment signal
13	AT02	O	ATF servo	ATF servo ON/OFF controller ATF ON . . . . L → Signal on tape ATF OFF. . . .H→ No signal on tape
14~20	N.C			N.C
21~24	COM0~COM3	O	LCD	LCD common signal
25~28			LCD	LCD reference voltage
29	CEB-A	O	HD62004A	Chip enable
30	CEB-B	O	HD62014A	Chip enable
31	CMD	O	HD62004	Data synchronizing signal
32	LA	O	HD62014	Data latch clock
33	GND			GND
34	TR OK	O	HD62004 HD62014	Interrupt "OK"
35	CEB-C	O	TC110G08AF	Chip enable
36	EX MUTE	O	L-OUT, HPcircuit	L-OUT headphone shoot
37		O	REC lamp	REC display LED on signal
38	REE2	I	Reel comparator	Reel rotary detection
39	SCKB	O	HD62004 HD62014	Data clock
40	SI	O		Data output
41	SOO	I		Data input
42	TRQ	I	HD62004	Interrupt request to CPU
43	REQ	I	PW-SW etc. HD62014	PW-SW eject button ON detect Interrupt to CPU
44	DNG	I	Power source	Battery voltage check
45	CAC	I	Mechanical block	Capstan FG input 468 Hz or 400 Hz

Pin No.	Terminal name	Type	Connected to	Function
46	CNT	O	Power source	PW control "L" → PW-ON
47	SREC	O	Cylinder servo	Cue/Review "H"
48	X100	O	Cylinder servo	Cue/Review → "L" FF/REW → "H"
49	AHPH	O	Mechanical block	Cue/REC forbidden hole detection
50~53	KI	I	Console key	Key matrix
54~54	+VDD		Power source	+VMB
56	N.C			N.C
57	+VDD		Power source	+VMB
58~59	Q1, Q2	I & O	Crystal	Crystal connection terminal
60~63	KC	O	Console key	Key matarix
64	EOT	I	Mechanical block	Tape end detection (Clear tape section "L")
65	BOT	I	Mechanical block	Tape start section (Clear tape "L")
66	DEW	I	Mechanical block	Dew sensor (Dew "L")
67	END	I	Power source	Battery end detection
68	RESET	I	RESET circuit	Reset input "L"
69~80	S0~S11	O	LCD	LCD segment signal

4-3. Digital I/O and Audio Interface (TC110G08AF)

1. Outline

This Gate array LSI controls HD62004A, HD62014A and operates A/D, D/A convertion and Interface of digital I/O.

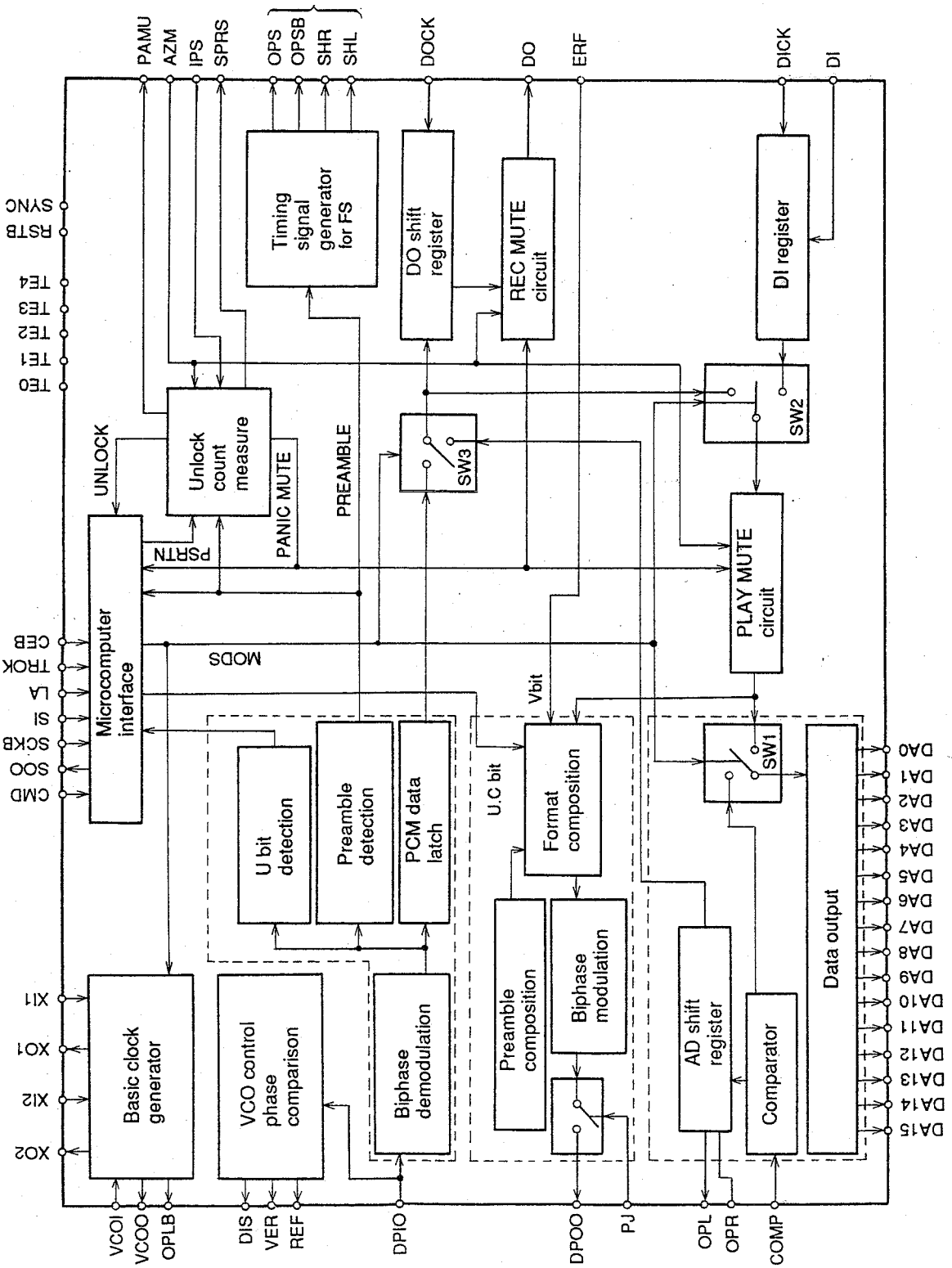
2. Features

- Corresponding 48kHz and 44.1kHz.
- Digital/Audio/Interface specification (CP340)
- C bit is selected by Microcomputer.
- U bit can control START-ID and SHORTENING-ID.
- Serial A/D, D/A mode and Audio signal interface.
- 16 bit parallel D/A interface. (Offset binary output)
- 16 bit parallel A/D comparison.
- Zero cross REC MUTE
- Zero cross PLAY MUTE
- PLL unlock mute

3. Components

- Basic clock generate
- VCO control
- FS (Sampling Frequency) timing control
- Digital IF format demodulation
- Digital IF format composition
- A/D, D/A interface
- Playbacked mute
- Play mute
- PLL unlock control

4. BLOCK


PAMU
AZM
IPS
SPRS
OPS
OPSB
SHR
SHL
DOCK
DO
ERF
DICK
DI
SYNC
RSTB
TE4
TE3
TE2
TE1
TE0
Timing signal generator for FS
DO shift register
REC MUTE circuit
DI register
SW2
SW3
UNLOCK
Unlock count measure
PREAMBLE
PANIC MUTE
PSRTN
MODS
PLAY MUTE circuit
CEB
TROK
LA
SI
SCKB
SOO
CMD
Microcomputer interface
Vbit
U bit detection
Preamble detection
PCM data latch
U.C bit
Format composition
SW1
Data output
DA0
DA1
DA2
DA3
DA4
DA5
DA6
DA7
DA8
DA9
DA10
DA11
DA12
DA13
DA14
DA15
XI1
XO1
XI2
XO2
Basic clock generator
VCO control phase comparison
Biphase demodulation
Preamble composition
Biphase modulation
AD shift register
Comparator
VCOI
VCOO
OPLB
DIS
VER
REF
DPIO
DPOO
PJ
OPL
OPR
COMP

5. LSI Pin Function

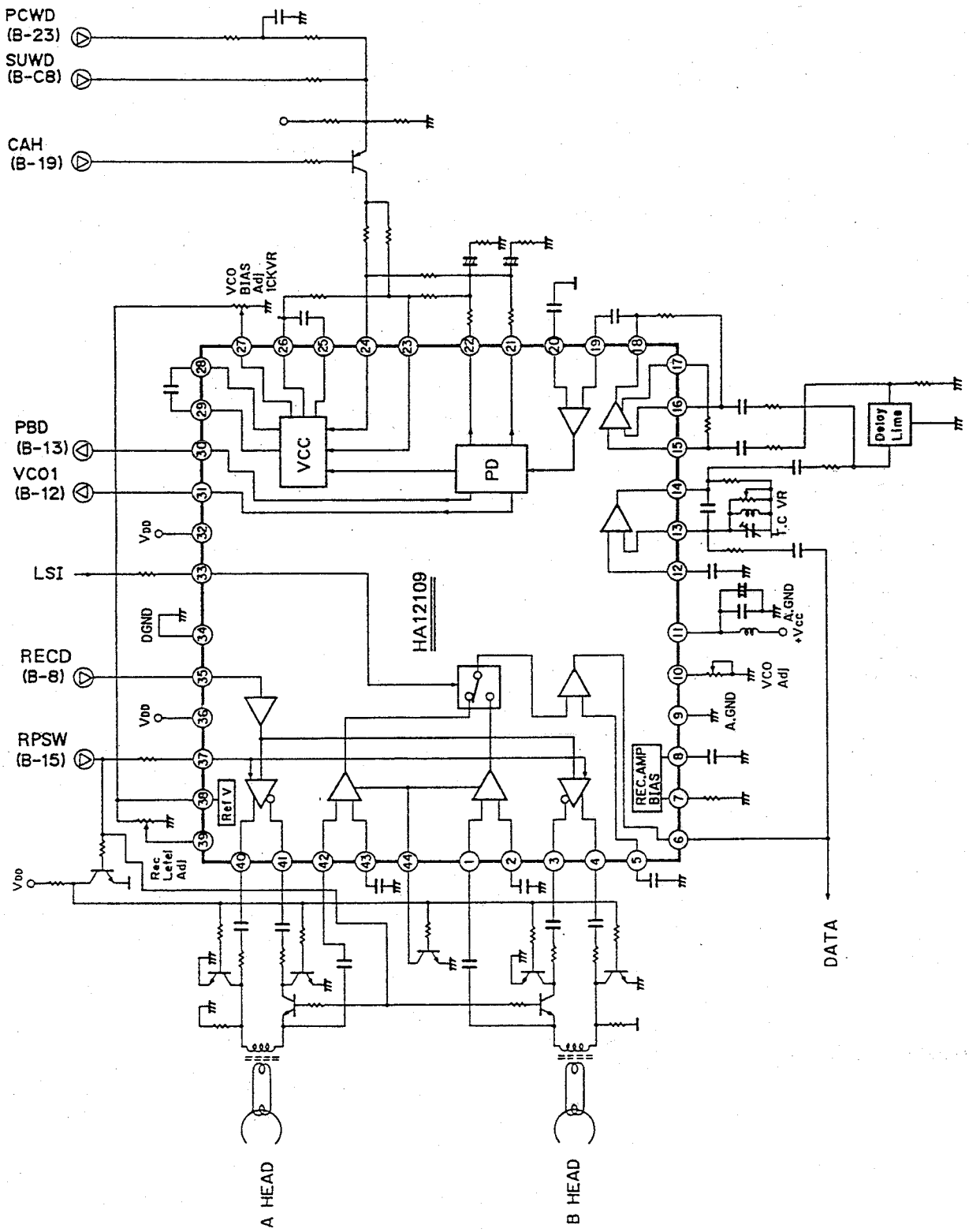
Pin No.	Terminal name	In/OUT	Function
1	DI	IN	PCM data input for Play.
2	DICK	IN	PCM data input for Play clock pulse.
3	DOCK	IN	PCM data output for Playback clock pulse.
4	DO	OUT	PCM data output for Playback.
5	CMD	IN	Timing signal for Command data receiving terminal.
6	SOO	OUT	Data output for Microcomputer I/O.
7	SCKB	IN	Data bit clock for Microcomputer I/O.
8	SI	IN	Data input for Microcomputer I/IO.
9	LA	IN	Data latch timing signal for Microcomputer I/O.
10	VSS	—	GND terminal.
11	TROK	IN	Input/output change-over signal for Microcomputer I/O.
12	RSTB	IN	Reset signal input terminal.
13	SPRS	OUT	Sampling clock output for HD62004A.
14	AZM	IN	Azimuth signal input terminal.
15	IPS	IN	Sampling clock input terminal.
16	XI2	IN	11.289 MHz clock pulse terminal.
17	XO2	OUT	
18	XI1	IN	12.288 MHz clock pulse.
19	XO1	OUT	
20	DIS	OUT	VCO discharge output terminal.
21	VAR	OUT	VCO valiable output terminal.
22	REF	OUT	VCO reference output terminal.
23	VSS	—	GND terminal.
24	VCO1	IN	VCO clock terminal.
25	VCO0	OUT	
26	VDD	—	+5V.
27	PAMU	OUT	Digital in mode. Mute on — H
28	DPIO	IN	Digital in signal input terminal.
29	DPO0	OUT	Digital Out signal output terminal.
30	PJ	IN	Digital Out on/off signal.

Pin No.	Terminal name	In/OUT	Function
31	OPR	OUT	R channel when an AD mode is selected. Offset adjusting output.
32	OPL	OUT	L channel when an AD mode is selected. Offset adjusting output.
33	SHR	OUT	R channel sample/Hold signal output terminal.
34	OPSB	OUT	R channel select signal.
35 ~ 41	DA1~DA6	OUT	Data output terminal.
42	VSS	—	GND terminal.
43 ~ 50	DA7 ~ DA14	OUT	Data output terminal.
51	DA15	OUT	DA15 (MSB) output terminal.
52	COMP	IN	Comparator input for sequential comparison.
53	OPS	OUT	L channel select signal.
54	SHL	OUT	L channel sample/hold signal.
55	SYNC	IN	Connected to Ground.
56	CEB	IN	Chip enable for Microcomputer I/O.
57	OPLB	OUT	Internal basic clock output terminal.
58	VDD	—	+5V.
59 ~ 63	TE0~TE4	—	For testing (No used)
64	BRF	IN	Error flag for V bit input terminal.

5. IC BLOCK DIAGRAM

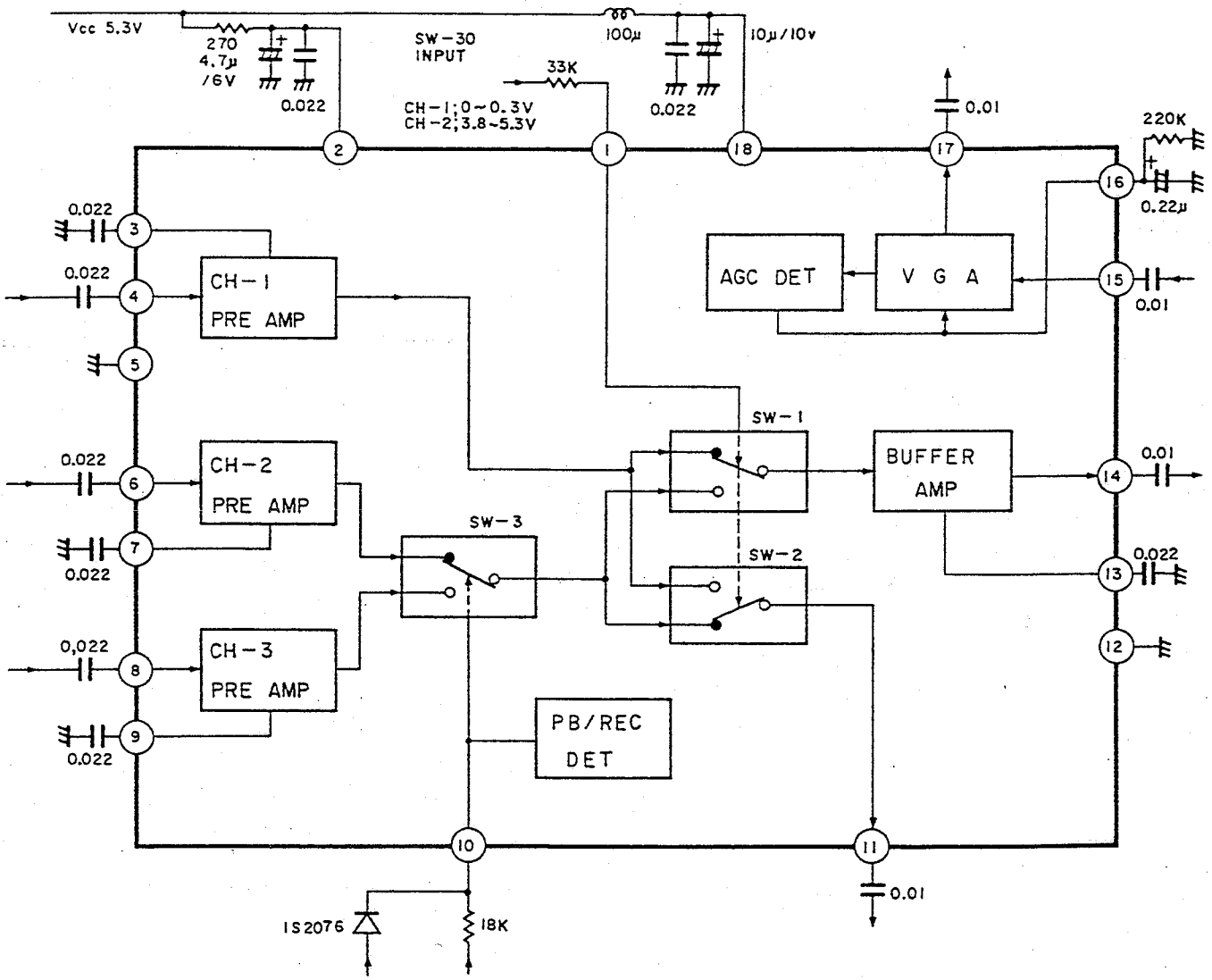
5-1. Data Strobe IC (HA12109)

Data strobe for signal transaction



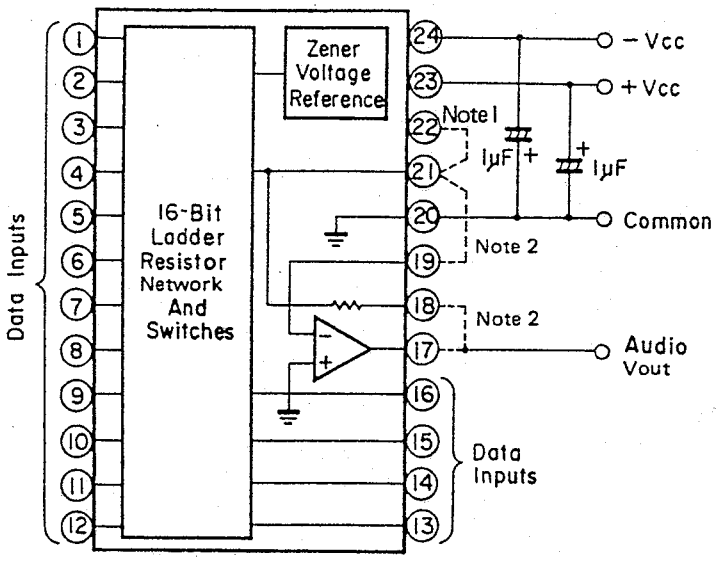
5-2. Head Amp. (HA11851MP)

Head Amp. with change-over switch of REC/PLAY.



5-3. Digital to Analog Converter (PCM55HP)

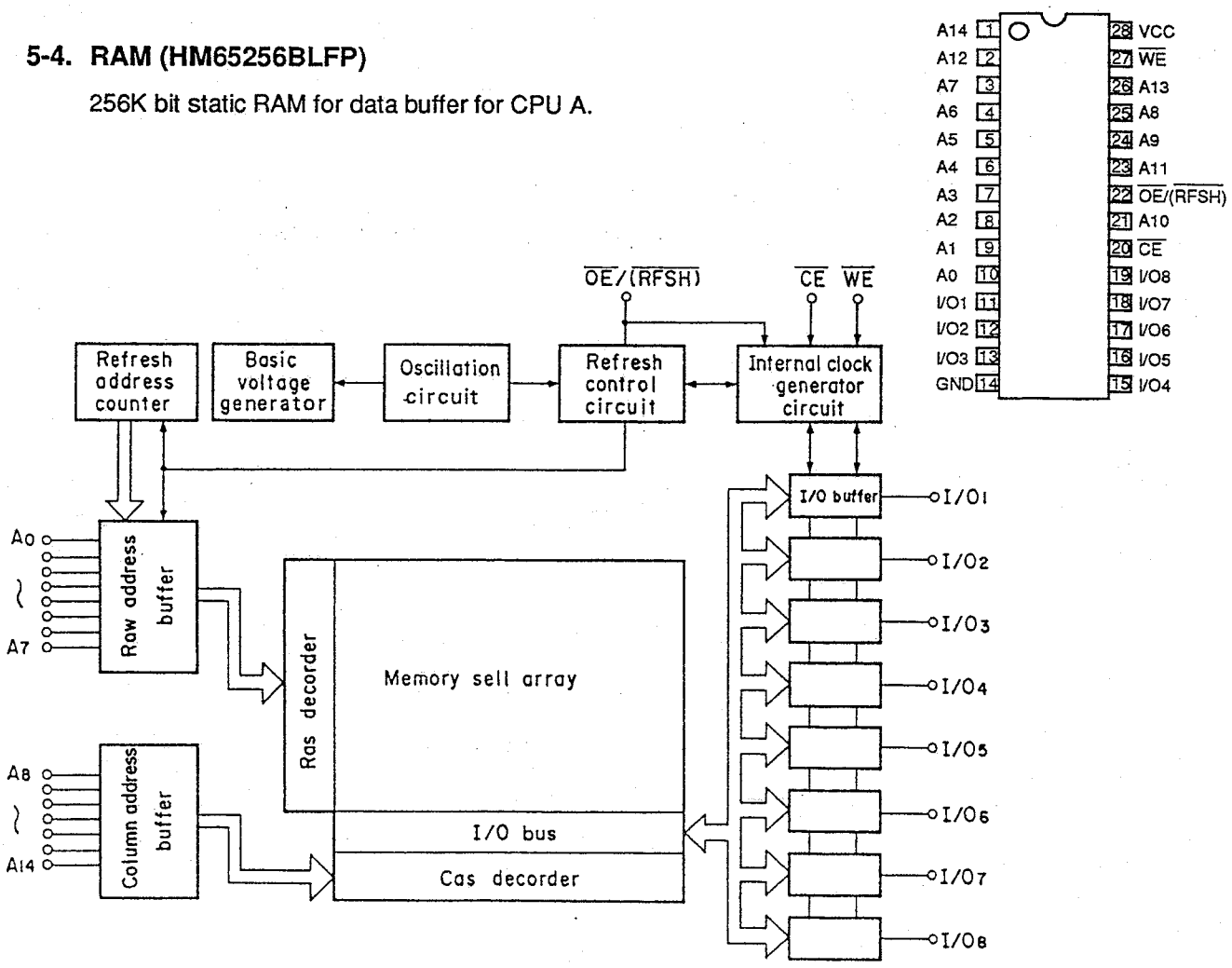
16-bit digital to analog converter. Also, together with comparator and CPU A, it is used as analog to digital converter.



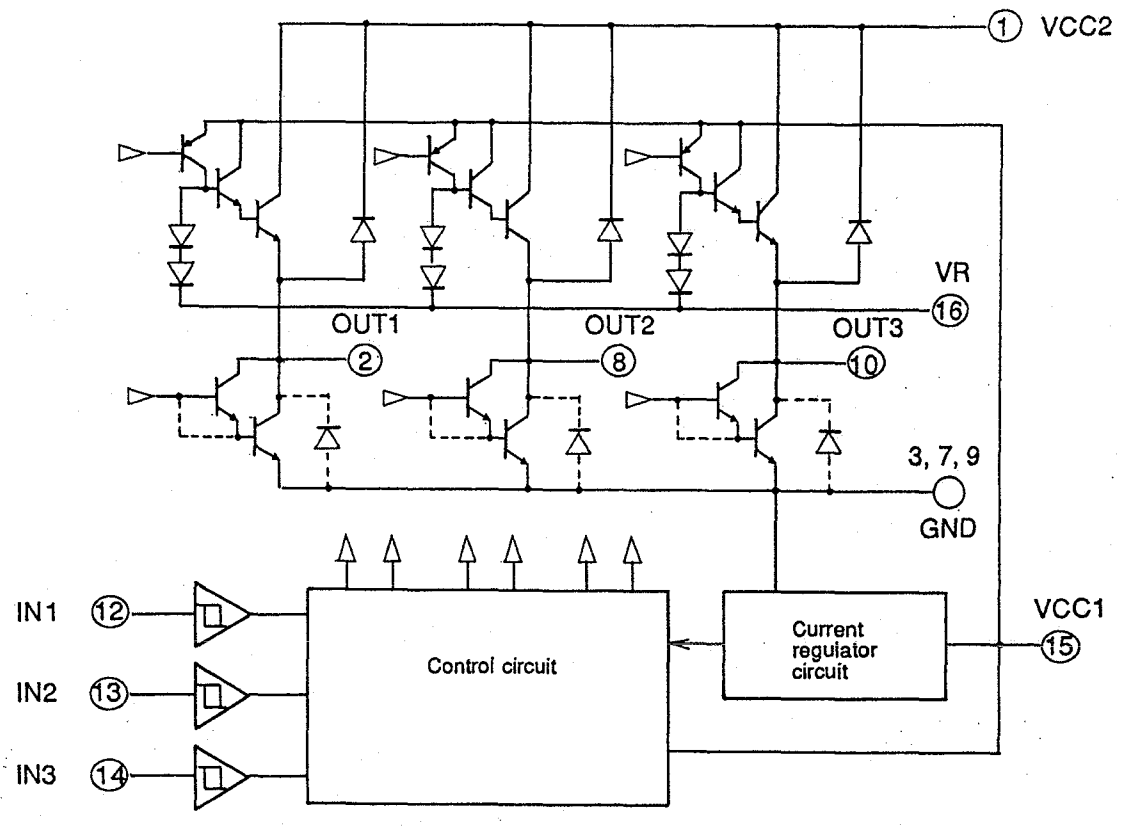
Pin	PCM55-Flatpak	Pin	PCM55-Flatpak
1	Bit 1 (MSB)	13	Bit 13
2	Bit 2	14	Bit 14
3	Bit 3	15	Bit 15
4	Bit 4	16	Bit 16
5	Bit 5	17	Voltage Output
6	Bit 6	18	Feedback Resistor
7	Bit 7	19	Summing Junction
8	Bit 8	20	Common
9	Bit 9	21	Current Output
10	Bit 10	22	Bipolar Offset
11	Bit 11	23	+ Vcc
12	Bit 12	24	- Vcc

5-4. RAM (HM65256BLFP)

256K bit static RAM for data buffer for CPU A.

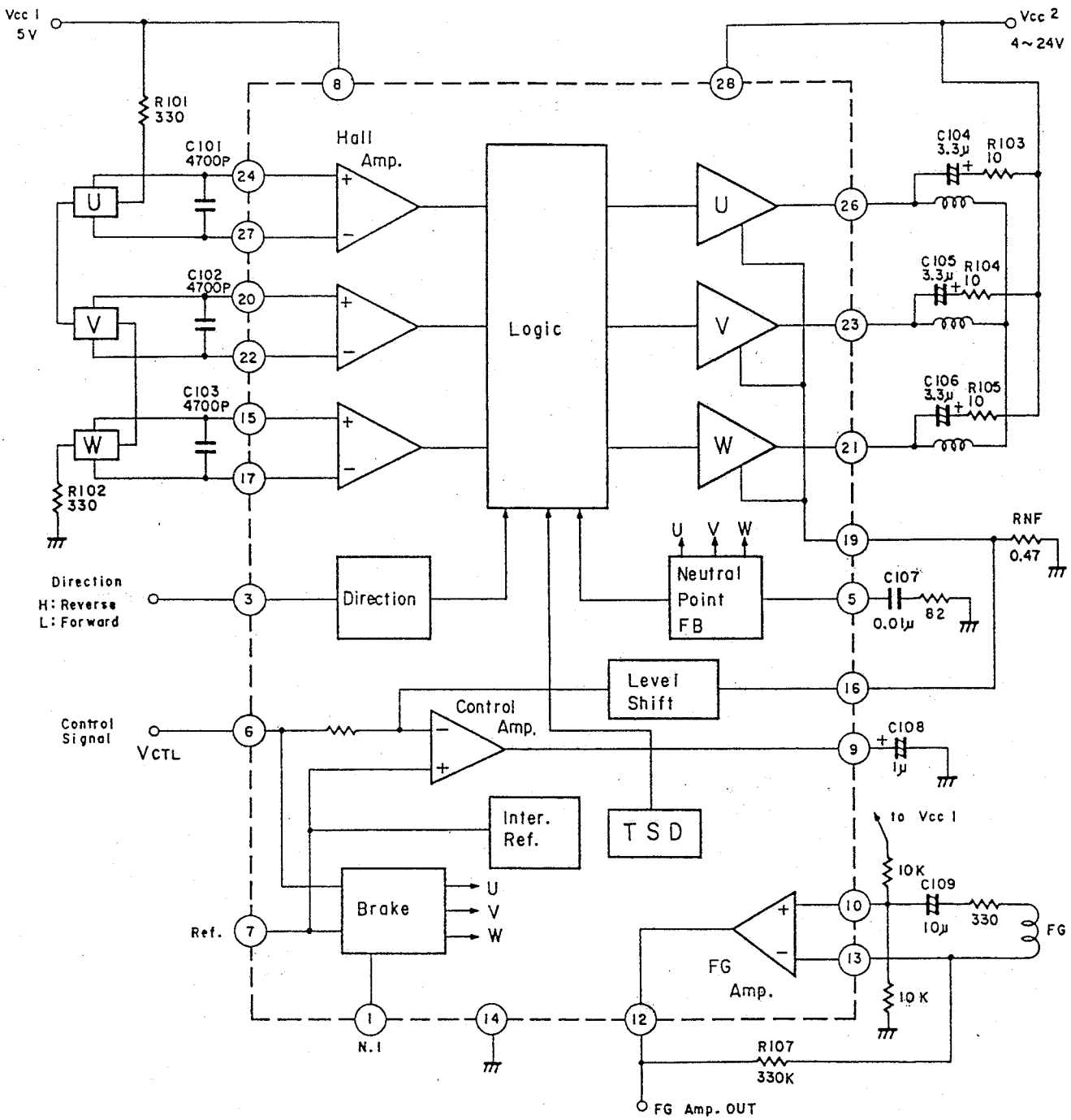


5-5. Loading Motor Driver (M54649FP)

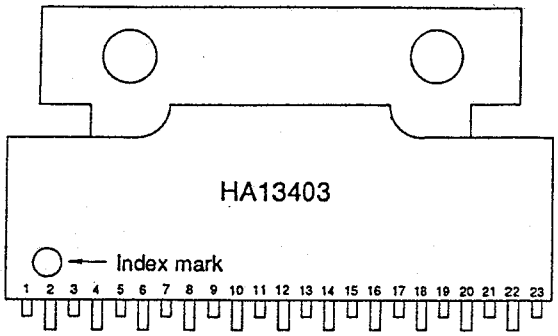


INPUT			OUTPUT			
12 PIN (IN1)	13 PIN (IN2)	14 PIN (IN3)	2 PIN OUT1	8 PIN OUT2	10 PIN OUT3	REMARK
L	L	L / H	L	L	L	BRAKE
H	L	L	H	L	OPEN	
H	L	H	L	H	OPEN	
L	H	L	H	OPEN	L	
L	H	H	L	OPEN	H	
H	H	L / H	L	L	L	BRAKE

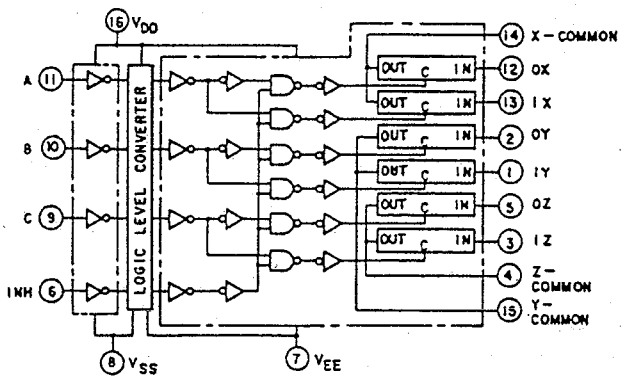
5-6. Cylinder Motor Drive (HA13403MP)

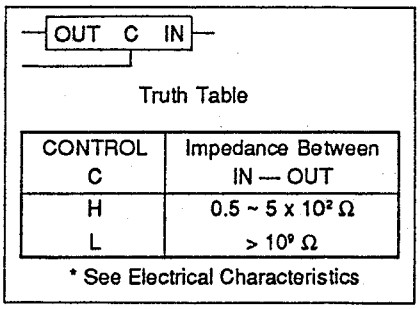


5-7. Capstan Motor Driver (HA13403)

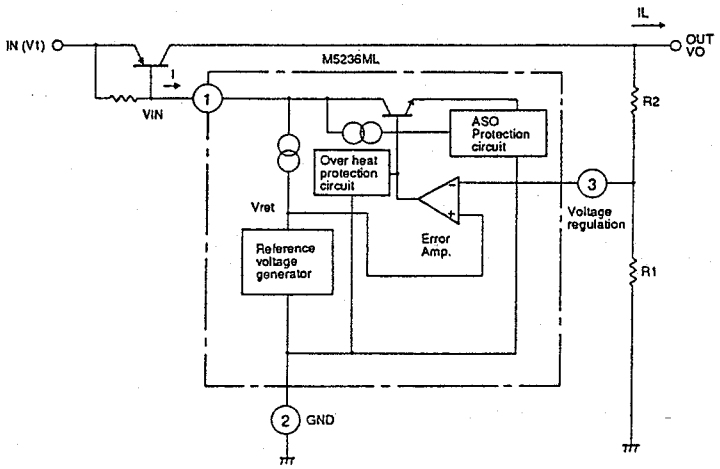


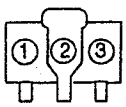
5-8. Multiplexer (μPD4053)





5-9. Voltage Regulators (M5236ML)

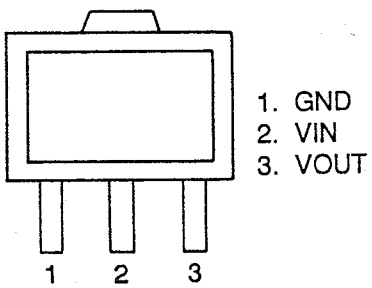




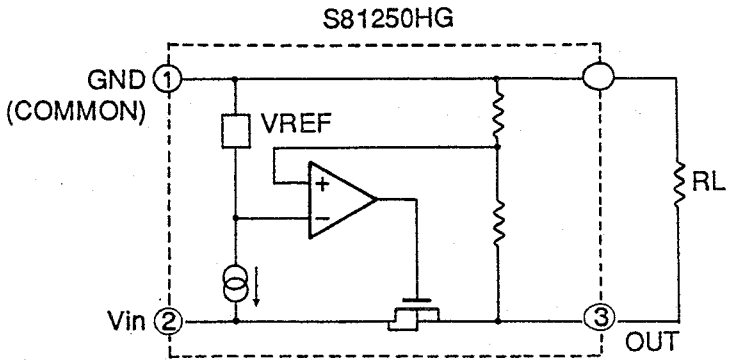
SOT-89

① Input
② GND
③ Voltage regulation

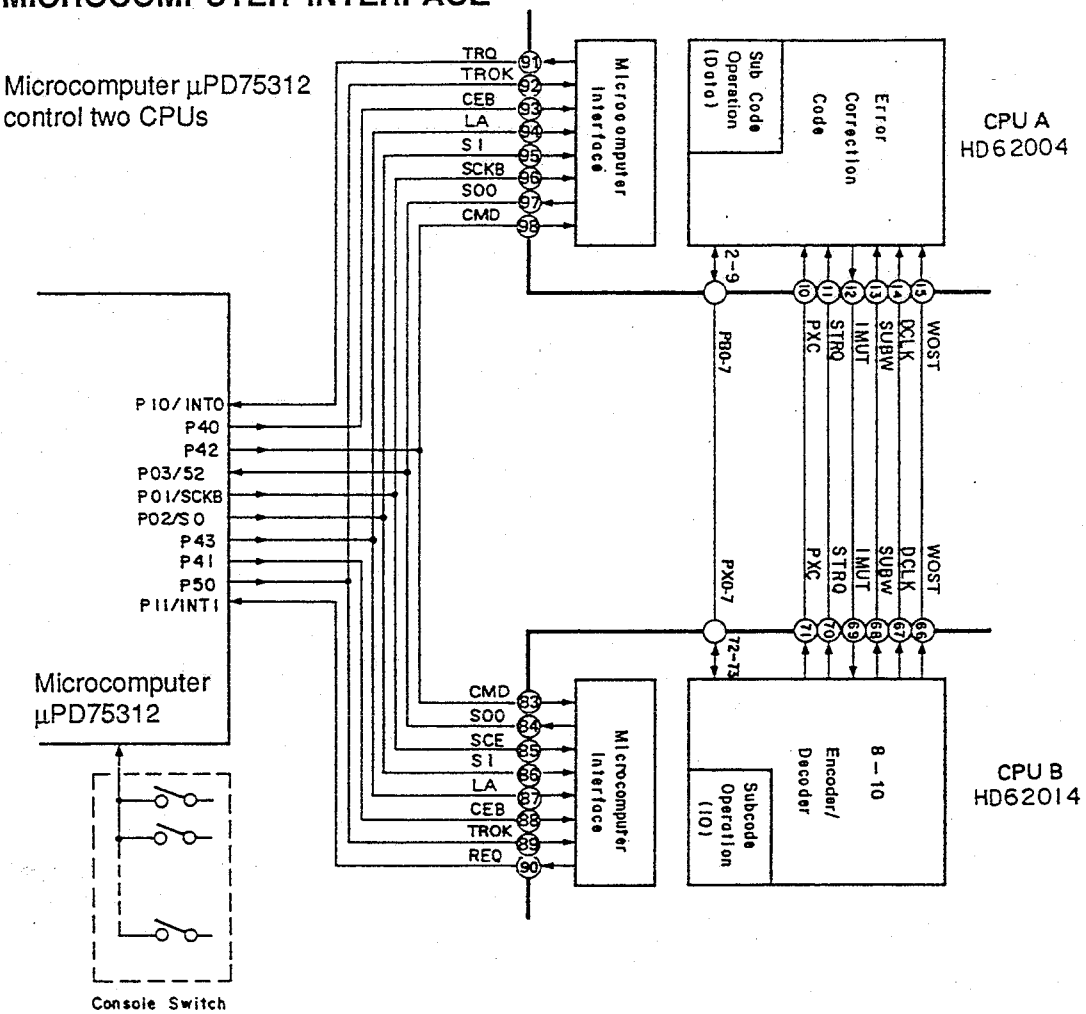
5-10.Voltage Regulators (S81250HG)



1. GND
2. VIN
3. VOUT



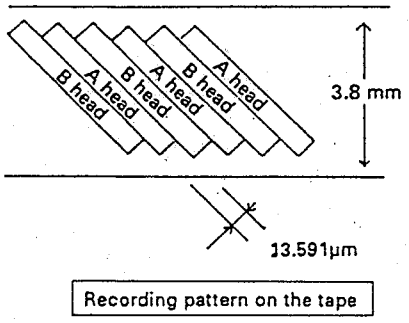
6. MICROCOMPUTER INTERFACE



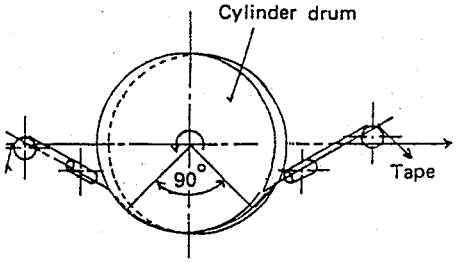
HD62004/HD62014 terminal	Signal direction	µPD75312	Function
TRQ	—	PI0/INT0	Interrupt signal from HD62004
TROK	—	P40	Acknowledgement signal of interrupt
CEB	—	P42	Chip enable signal to HD62004
LA	—	P03/52	Latch clock signal
SI	—	P01/SCKB	Serial data output
SCKB	—	P02/SO	Data latch clock signal
SOO	—	P43	Serial data input
CMD	—	P41	Data synchronizing signal
CEB	—	P50	Chip enable signal to HD62014
REQ	—	P11/INT1	Interrupt signal from HD62014

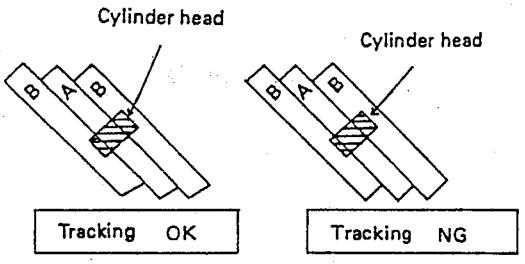
7. SERVO SYSTEM

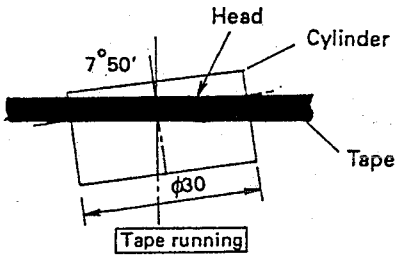
Controls for tape speed, cylinder rotary frequency and tracking are very important since recording pattern for DAT employs High-density recording system (114 MBPI²) in which the track-pitch is 13.591μm. Especially, the tracking is controlled by a servo system called ATF (Automatic Tracking Finding). The servo system is PWM (Pulse Width Modulation) which is controlled by digital signals.

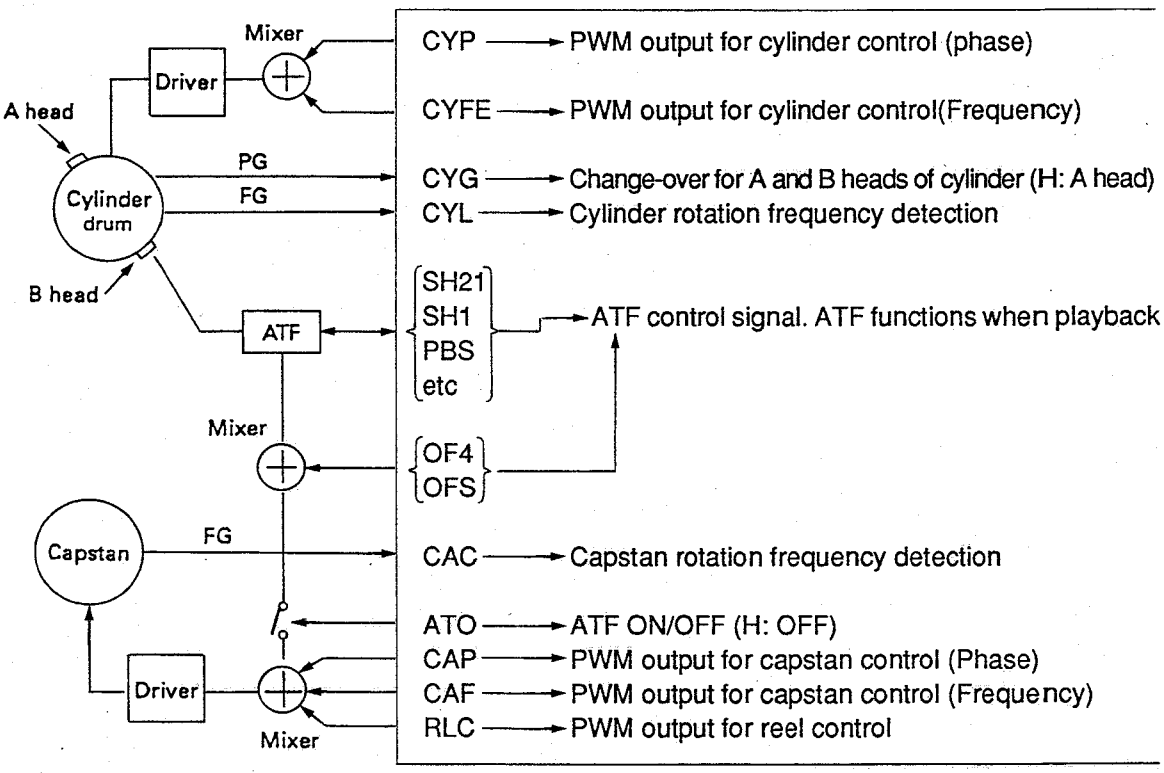


Recording pattern on the tape



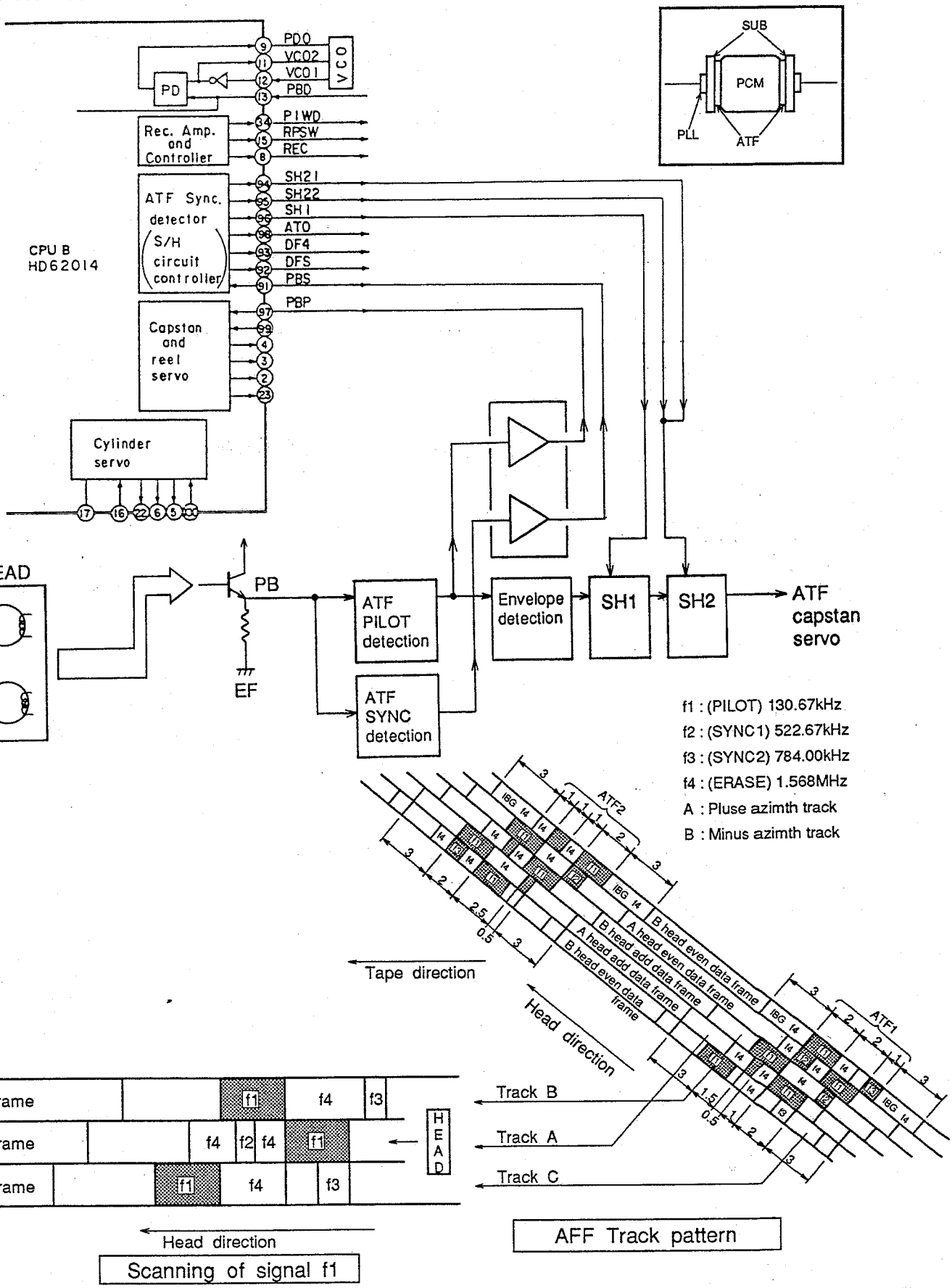






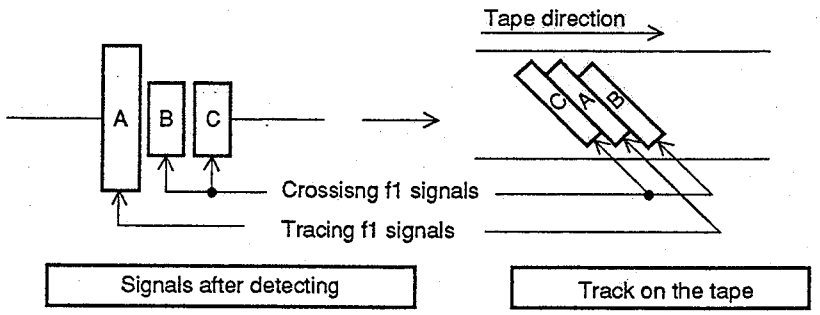
CPU B HD62014

7-1. ATF Servo

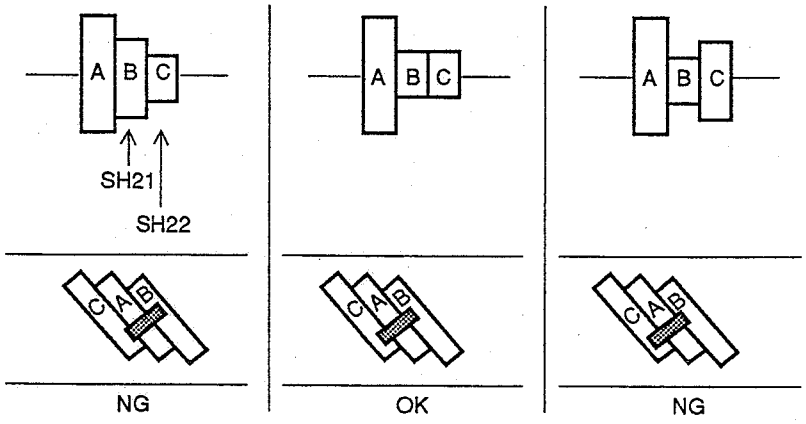

SUB
PCM
PLL
ATF
CPU B
HD62014
PD
VCO
PDO
VCO2
VCO1
PBD
Rec. Amp. and Controller
PIWD
RPSW
REC
ATF Sync. detector (S/H circuit controller)
SH21
SH22
SH1
ATO
DF4
DFS
PBS
PBP
Capstan and reel servo
Cylinder servo
HEAD
A
B
PB
EF
ATF PILOT detection
ATF SYNC detection
Envelope detection
SH1
SH2
ATF capstan servo
f1 : (PILOT) 130.67kHz
f2 : (SYNC1) 522.67kHz
f3 : (SYNC2) 784.00kHz
f4 : (ERASE) 1.568MHz
A : Pluse azimth track
B : Minus azimth track
Tape direction
Head direction
B head even data frame
A head add data frame
B head add data frame
A head even data frame
IBG 14
ATF2
ATF1
Track B
Track A
Track C
Data frame
Data frame
Data frame
HEAD
Head direction
Scanning of signal f1
AFF Track pattern

1. Play-back signal is input to sync. detector and pilot detector via head Amp.
   { Sync. fiter detectors signals f2 and f3 and, output them to CPU B as signal PBS.
   { Pilot filter detects signal f1, and output it to CPU B as signal PBP.

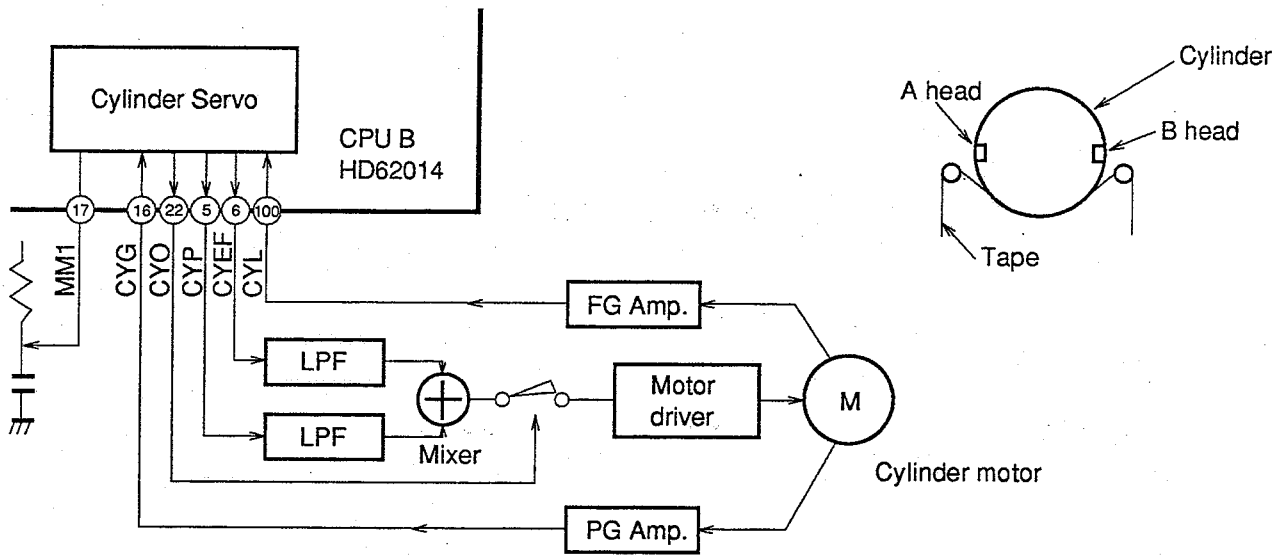
2. The pilot filter output is detected and is provided to ATF S/H circuit.



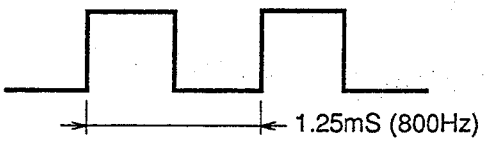
3. Crossing f1 signals are sampled and their voltage levels are compared by the ATF S/H circuit.
   Capstan and reel servo circuit controls the rotation frequency of the capstan motor so that the head traces the tracks correctly.



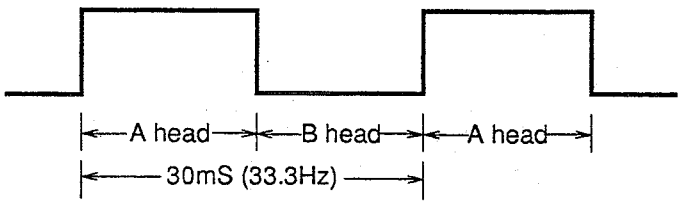
7-2. Cylinder Servo



CYL — FG — Cylinder motor consists of a pulse generator whose frequency varies in accordance with the motor rotation. When the cylinder rotation is normal speed (2,000 rpm), the motor provides 800 Hz signal CYL to CPU B.



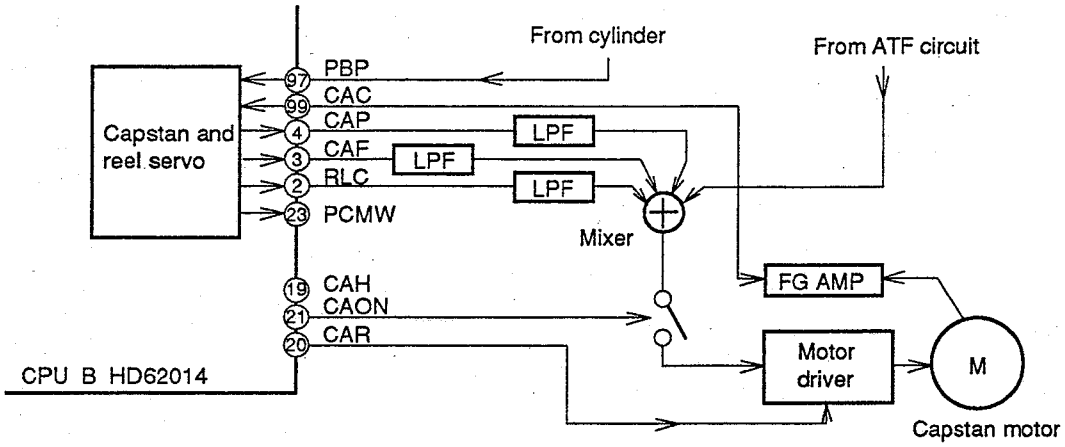
CYG — PG — Change-over signal for cylinder heads A and B



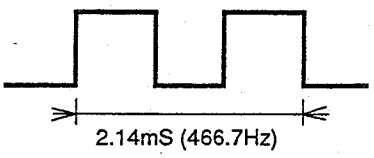
CYFE — Control signal for cylinder rotation frequency (PWM output)

CYP — Control signal for cylinder phase (PWM output)

7-3. Capstan Servo



CAC — FG — Provided from a pulse generator in the motor, signal CAC transmits the rotation speed of capstan motor to CPU B.



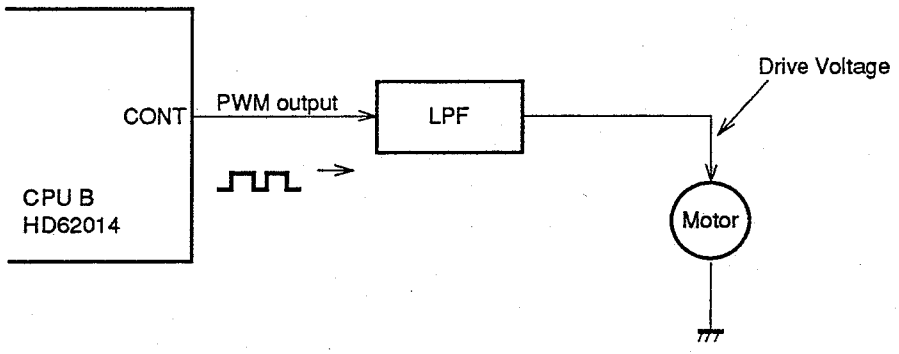
CAP — Control signal for capstan phase (PWM output)

CAF — Control signal for capstan rotation frequency (PWM output)

RLC — Control signal for reel (PWM output)

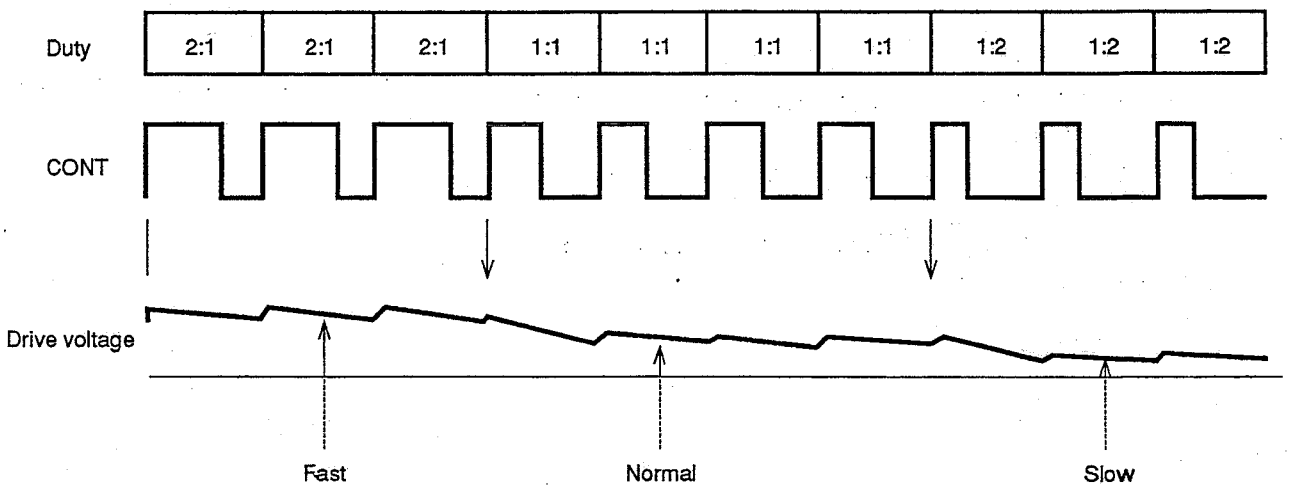
ATF — Control signal for tracking at play-back (PWM output)

7-4. Motor Control



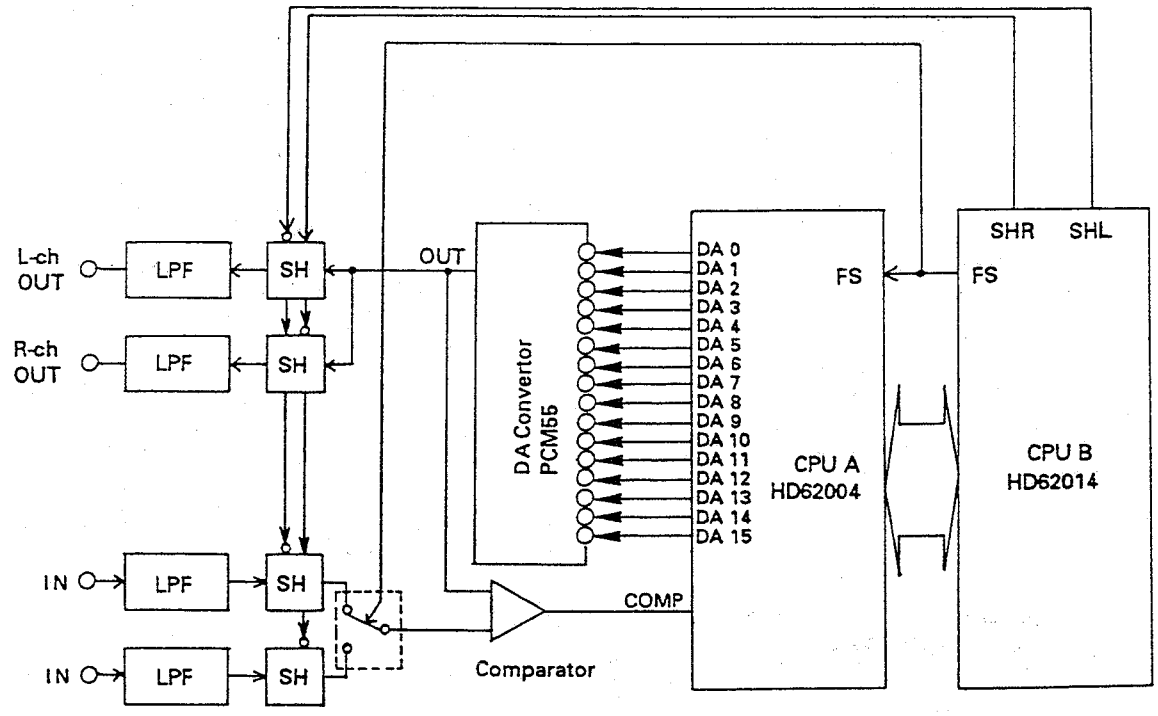
Motor speed is determined by the voltage of drive signal which is generated by means of filtering the signal CONT.

Drive voltage	Motor frequency
Large	Fast
Small	Slow



In accordance with the duty of pulse CONT, the driving voltage of motor is determined.

8. D/A • A/D CONVERTER BLOCK

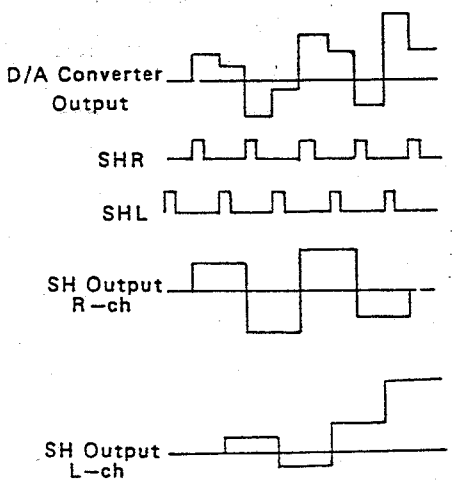


a. D/A Converter

Output signal from D/A converter is multiplex signal of L-ch and R-ch.

S/H (Sample and Hold) circuit separates L-ch and R-ch signals.

LPFs of Line-out cut unnecessary frequency and smoothes stepped waveform (⎍ → ⎍).



b. A/D Converter

A/D converter is constructed by D/A converter and comparator.

e.g. 4-bit A/D Converter

(1) Comparator compares analog input signal with digital output signal (1000) of D/A Converter.

(2) When the analog signal is bigger than the digital signal (1000), CPUs output digital signal (1100) and, again, the comparates them.

(3) As the same manner when the input is bigger than output, CPUs output signal (1110).
Also when the input is smaller than output, CPUs output signal (1010).

(4) The comparator compares the analog and the digital signals until both signals, value become the same.
Thus, an analog signal is converted into a digital signal.

9. ADJUSTMENTS

No.	Item	Adjustment VR	Tool
1	VDD voltage adjustment	VR1	Digital voltmenter
2	Linearity adjustment	Mechanical	Oscilloscope,Test tape TY-7251
3	Cylinder and clock pulse synchronism	VR2	Oscilloscope,Test tape TY-7551
4	PLL adjustment	VR4	f counter
5	REC ampere adjustment	VR5	Oscilloscope, Test tape TY-7551 Test tape TY-30B
6	Check for error rate		Oscilloscope, f counter Test tape TY-7551

9-1. VDD adjustment

[Checkpoints] Test pad VDD (MAPCB)

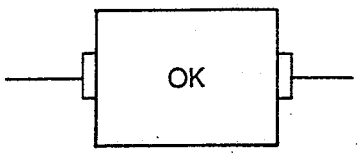
[Procedure] (1) PW - Turn it on.

(2) Adjust VR1 so that VDD test pad is 5.1V ± 0.05V.

9-2. Linearity adjustment

[Checkpoints] Oscilloscope CH1 Test pad PG (MA PCB)
Oscilloscope CH2 Test pad PBO (MA PCB)

[Procedure]

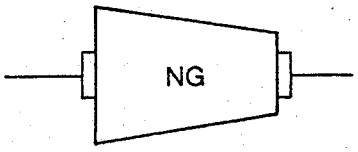


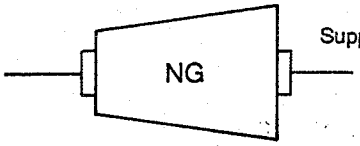
(1) Connect an oscilloscope.

(2) Set the Test Mode (Power switch is turned on while press down together with STOP. PAUSE and REC/MUTE buttons, then press the STOP button again).

(3) Insert test tape TY-7251, and press the play button.

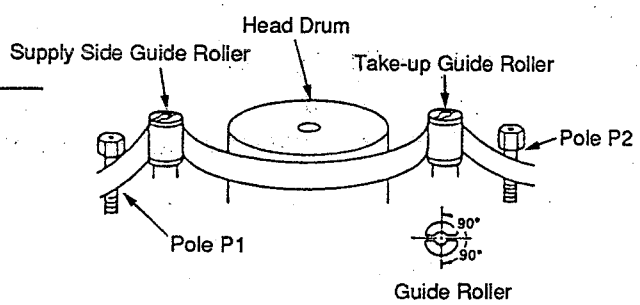
(4) Adjust the height of the mechanical tape guide so that the PB pad is positioned as shown left (the upper and lower lines are parallel to the center line).



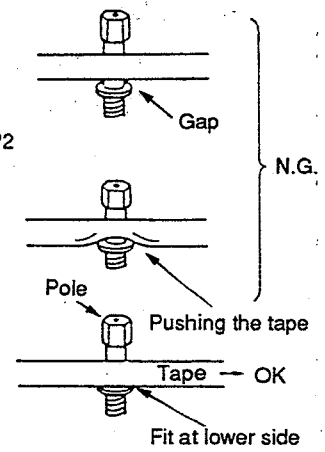


Caution:

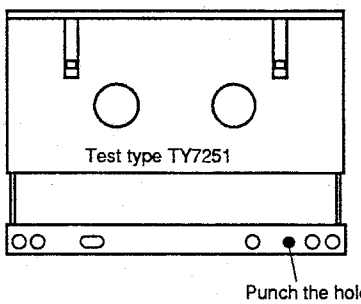
1) **At the adjustment, be sure to move the two guide rollers within ±90° and paint the original position with a marker. Also make sure to check the tape running as follows.**



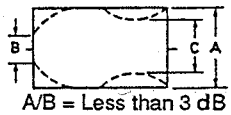
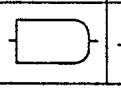
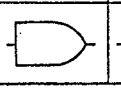
Note: Be sure not to move two poles.



2) **Be sure to punch at the hole as show below.**



3) **If the tape is out of the position, the following DATA envelopes are observed.**

	Out Range			Allowance of Out Range
	Small	Medium	Large	
Supply side				 A/B = Less than 3 dB A/C = Less than 3 dB
Take-up side				

9-3. Cylinder and Clock Pulse Synchronism

At play mode, using the test tape TY-7551, adjust PG phase adjustment VR (VR2).

[Checkpoints]

Oscilloscope Channel 1 — Test pad PBO

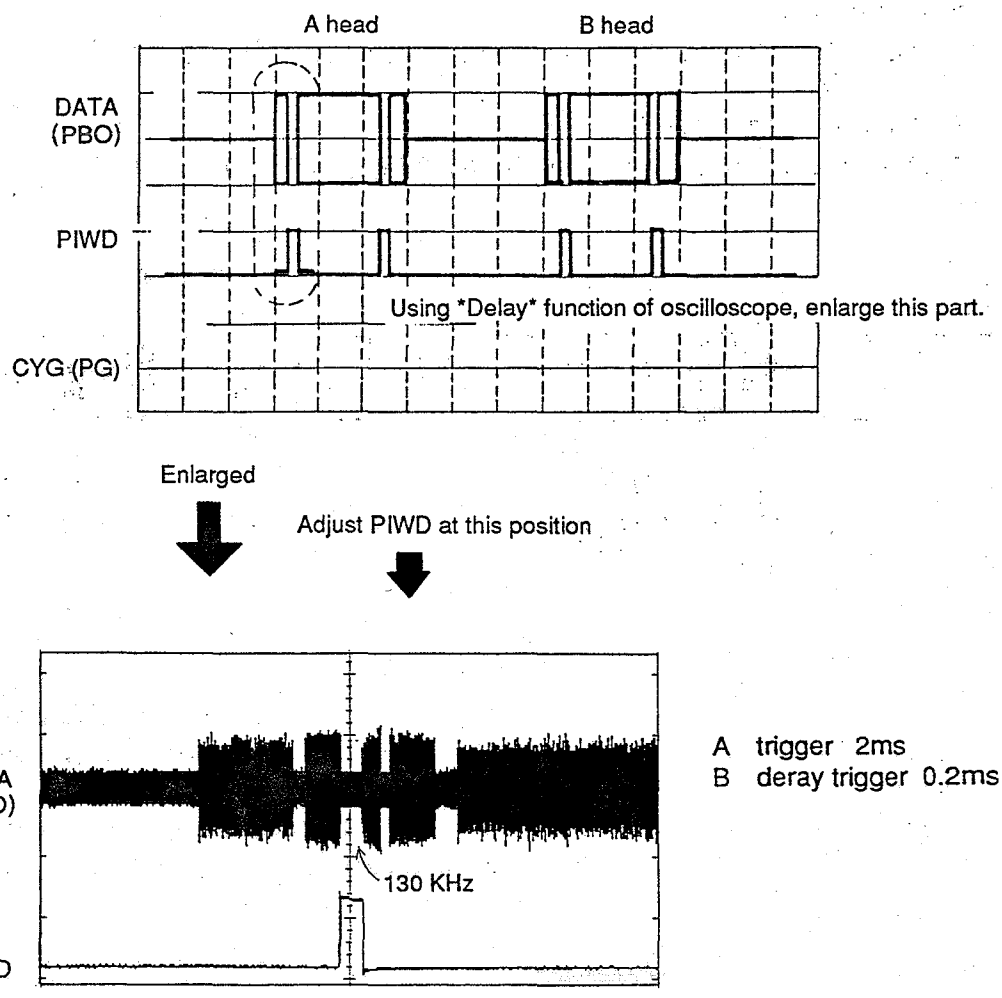
Oscilloscope Channel 2 — Test pad PIWD

External Trigger — Test part PG (MA PCB)

[Adjusting Method]

(1) Turning of VR2 moves signal PIWD right or left.

(2) Adjust VR2 so that the rising edge of signal PIWD stops at the point that 130 KHz pilot signal start.



9-4. PLL adjustment

[Checkpoints] Test pad VCO1.

[Procedure]

(1) Connect the f counter to the test pad (VCO1).

(2) Relay the test tape TY-7551.

(3) Adjust VR4 so that the value of the f counter is 9.7 ± 0.02 MHz.

9-5. REC Level

[Checkpoints]

Oscilloscope Channel 1 — Test pad PBO

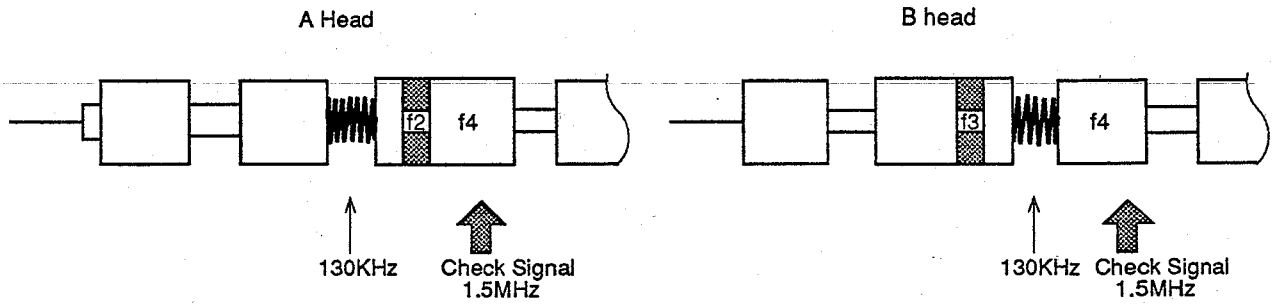
Oscilloscope's External Trigger — Test pad PG

[Adjusting Method]

(1) Adjust VR5 so that the voltmeter shows 2.4 V at pin 39 of HA12109 tentatively when blank tape is recorded.

(2) Playback test tape TY-7551.

(3) Observe waveforms of the followings and check the voltage levels f4 of A and B heads.



(4) Set test tape TY-30B and record no sound for about 2 min. (Be sure to use non recorded section of the tape)

(5) Adjust VR5 so that the recorded signals f4 of the two test tapes are the same level.

(6) When making this adjustment, check the interchangeability of the tapes.

Is it possible for this DAT to correctly record data, etc. on tape which was used with any other brand DAT? (Is rewriting possible?)

Is it possible for other brand DAT to correctly record data, etc., using a tape which was used with this DAT?

9-6. Error Rate

This check is required to check if adjustment is correctly adjusted, using the test tape TY-7551.

[Checkpoints]

Oscilloscope Channel 1 — Test pad F1ER (pin 90 of HD62004)

Oscilloscope Channel 2 — Test pad PB0

Oscilloscope's External Trigger — Testpoint PG

Also connect a frequency counter on Testpoint F1ER

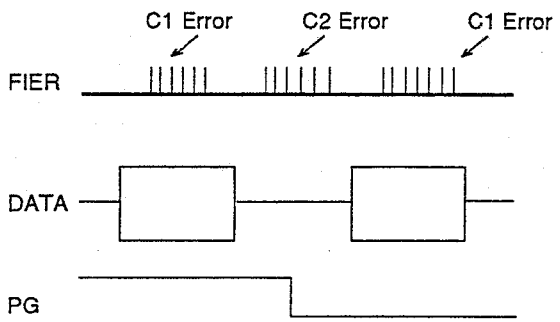
[Checking Method]

(1) Track No. 13 of test tape TY-7551.

(2) The frequency counter's reading is under 96 Hz.

(3) Observing the oscilloscope screen make sure that no C2 Error occurs at muted area on the tape.

(4) If the adjusted value is off the specified value, adjust 1 to 4 again. If still the same it could be PCB faulty.



The DA-P20 faulty when C2 Error occurs at muting areas on the tape.

One pulse appears on F1ER terminal per one error

Note: If the test tape is poor C2 error occurs frequently. Therefore make sure the condition before the adjustment.

10. S. C. M. S. (The Serial Copy Management System)

S.C.M.S. has been announced in July 1989, and is a new protection system for D.A.T. copyright. DA-P20 adopts the Serial Copy Management System. Unlike previous systems, the SCMC standard limits direct recording from a compact disk to first generation copies (one-time recording only). SCMS provides you with digital recording capabilities for personal use, without infringing on the rights of copyright holders.

The following shows the restrictions on digital recording that are imposed by the SCMS standard of the DA-P20.

Figure 1 (Recoridng from digital sources with copyright protection code)

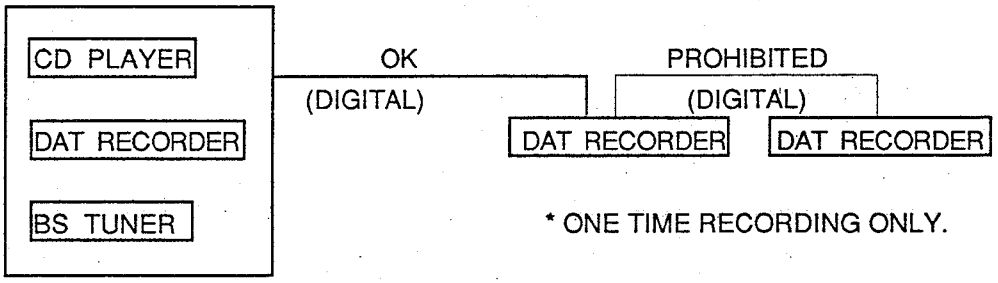


Figure 2 (Recording from digital sources without copyright protection codes)

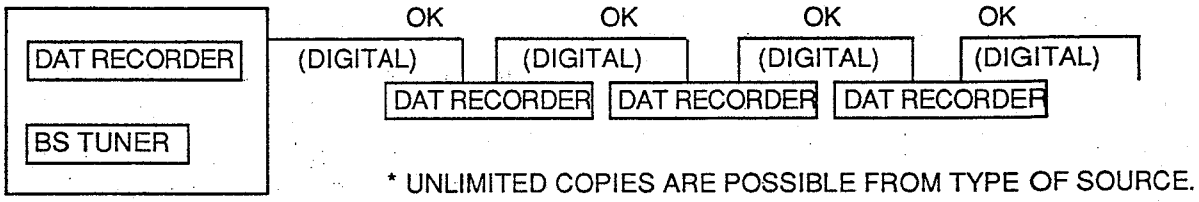


Figure 3 (Recording from digital sources without copyright protection function)

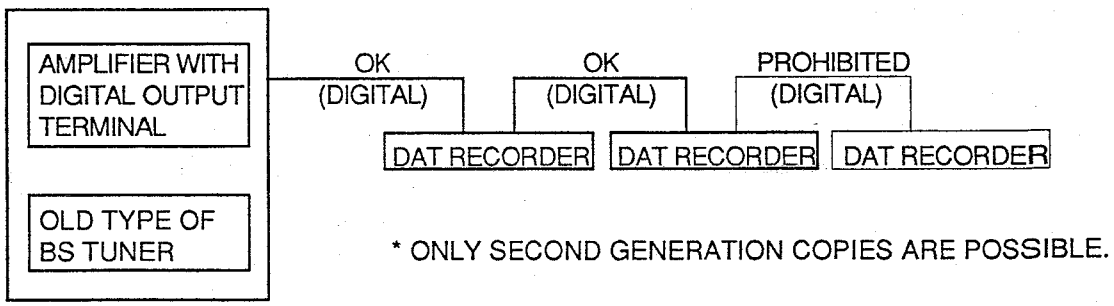
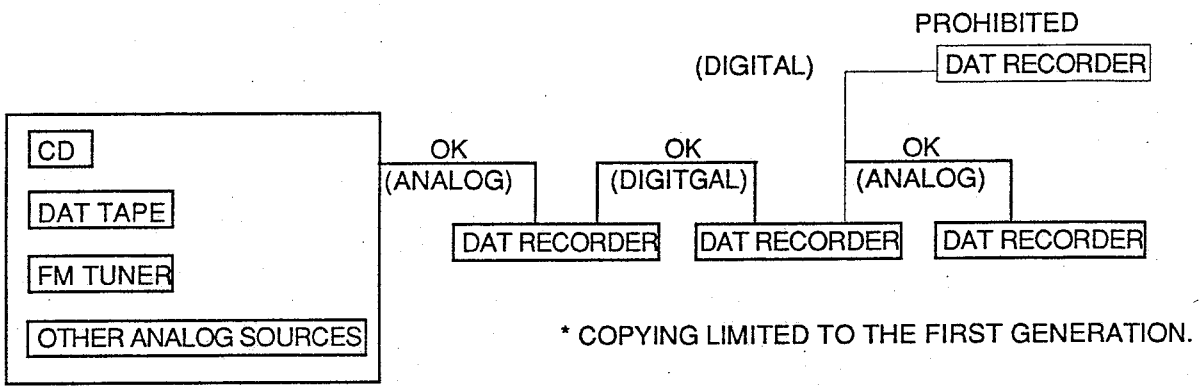


Figure 4 (Source tape recorded from analog input)



The signal from digital audio interface has category code and permission or prohibition flag for copyright. The category code indicates input signal such as CD, DAT, DAT MUSIC TAPE and BS TUNER. For example, in case of copyright from CD, digital copyright is made even prohibition flag exists when DAT recorder receives "10000000" as category code of CD. At same time, copyright prohibition information is recorded on DAT tape. If digital copyright is made from the recorded DAT tape, category code will be changed to "11000000". Then, copyright prohibition flag comes out from digital audio interface, copyright will be prohibited from two different information, one is the category code of DAT. The other is the recorded copyright prohibition flag.

Category Code Chart

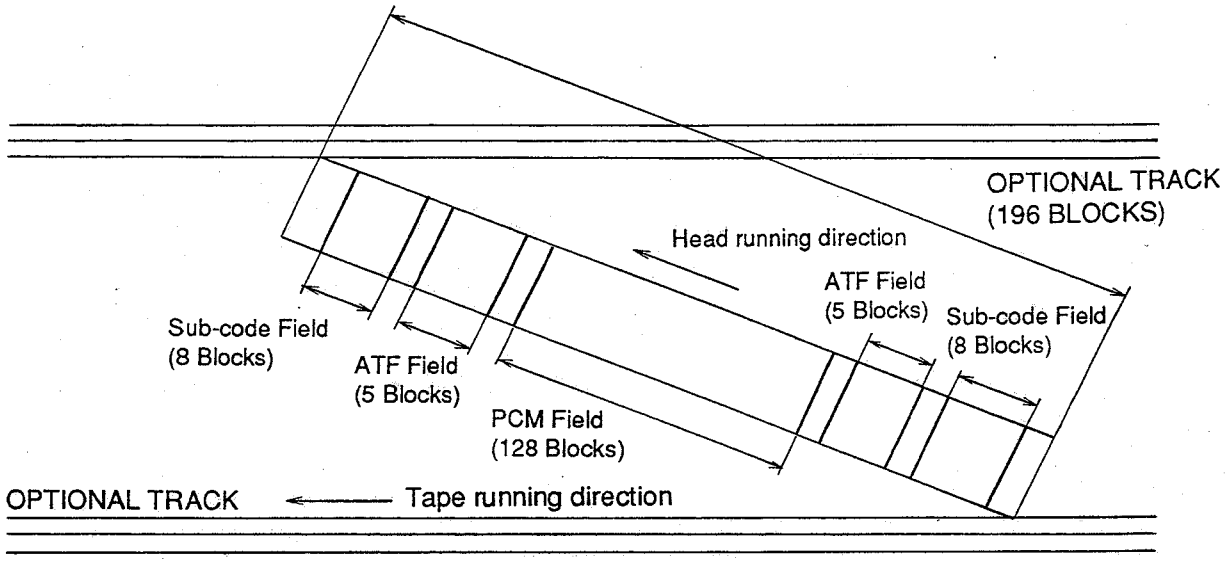
CATEGORY	CATEGORY CODE
GENERAL	00000000
CD	10000000
PCM PROCESSOR	01000000
BS TUNER	00100000
DAT	11000000
DAT-P	11000001

The following figures explain where information is recorded.

Figure-1 shows recording tape format and detail of one track on D.A.T. tape.

One track consists of 196 blocks which is recorded by one time moving of head from bottom to top at slant on the tape. Figure-2 shows the format for one of the 128 blocks which is main data field (PCM field).

Figure 1. (Composition of recording tracks on DAT tape)



(a) Tape Format

Figure 1

FIELD	DESCRIPTION	NUMBER OF BLOCK
MARGIN FIELE	MARGIN 1	11
SUB-FIELD 1	PRE-AMBLE SUB-DATA FIELD 1 POST-AMBLE 1	2 8 1
AFT FIELD 1	IBG 1 ATF 1 IBG 2	3 5 3
MAIN FIELD	PRE-AMBLE MAIN DATA FIELD	2 128
ATF FIELD 2	IBG 3 ATF 2 IBG 4	3 5 3
SUB-FIELD 2	PRE-AMBLE 3 SUB-DATA FIELD 2 POST AMBLE 2	2 8 1
MARGIN FIELD	MARGIN 2	11

HEAD RUNNING DIRECTION

196 BLOCKS

(b) Detail of One Track (196 blocks)

Figure 2

One block of main data area (PCM area) is grouped into Synchronous signal, Main ID and Main data. W1 and W2 in the Main ID consists of the ID format as shown in Fig. 4.

Synchronous signal	Main ID		Main ID	Main data (8x32=256 bits)			
	W1	W2	Parity				
8 bits	8 bits	8 bits	8 bits	8 bits	8bits		8 bits

MSB LSB

1 main data block = 8 + 8 + 8 + 8 + 8 x 32 = 288 data bits

Figure 3 Block Format for Main Data

W1 (Sub-code for main data)								W2 (Main data block address)							
B7	B6	B5	B4	B3	B2	B1	B0	B7	B6	B5	B4	B3	B2	B1	B0
Format ID 0	0	ID1 0		Frame address				0	x	x	x	x	0	0	0
Not fixed								0	x	x	x	x	0	0	1
ID2		ID3		Frame address				0	x	x	x	x	0	1	0
Not fixed								0	x	x	x	x	0	1	1
ID4		ID5		Frame address				0	x	x	x	x	1	0	0
Not fixed								0	x	x	x	x	1	0	1
ID6		ID7		Frame address				0	x	x	x	x	1	1	0
Not fixed								0	x	x	x	x	1	1	1

Figure 4 Main ID Format

The copy information is recorded at the upper 2 bits of W1 in the main ID.

ID6 in the tape	Play signal		Copy mode
	Category	Copy informations	
00	DAT	OK	Free copy possible
10	DAT	Prohibition	No copy possible
11	DAT-P	OK	Only one phase copy possible

In conventional system, there are two types for recording of Free copy "00" and No copy "10". SCMS system has one more type "11" which makes one phase copy possible.

Fig. 4 Relational table of ID and Play signal copy during digital copy.

For example, the "11" is recorded in ID6 when DAT records the analog signal from FM tuner or Cassette player. When playing this tape, the logic reads the "11" information in the ID6, and outputs the copy prohibit code to the digital audio interface. In SCMS system, when receiving the category code of the DAT music tape, copy is made even if the copy prohibit exists, and the "10" is recorded in ID6.

CATEGORY	CATEGORY CODE
General	00000000
CD	10000000
PCM Processor	01000000
BS Tuner	00100000
DAT	11000000
DAT Music Tape	11000001

Main Category Code

If copy is tried on this tape, the logic reads "10" in ID6, and outputs the copy prohibit code to the digital audio interface as the category code is DAT "11000000".

Consequently the copy is prohibited by two conditions of DAT category code and the copy prohibit.

Audio Input/Output Block

Refer to the figure of Audio Signal Input/Output on page 15.

① Analog Recording

Audio signals from the microphone or the line-in terminal are emphasized for the high-pass area through the pre-emphasis circuit for improving the high-pass characteristics during playing.

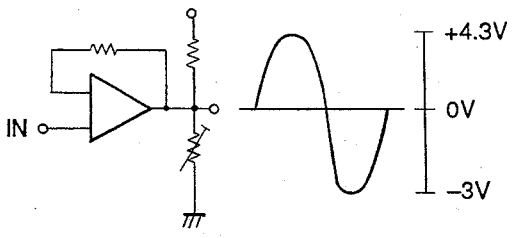
After eliminating unnecessary band over 20KHz by the low-pass filter, signals are quantized. FSB signal output from LSIC turns on and off the analog switches to pick up the left and right signals alternately.

D/A converter PCM55 is used as an analog converter during recording, and receives signals through REC/PLAY switching relay. Every bit of the data (DA0 ~ DA15) of the A/D converter compares the input sound potential with the outpout potential.

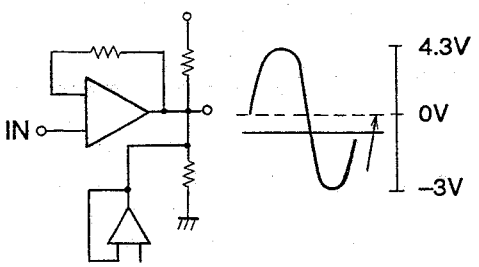
Comp terminal of LSIC receives different voltage by the comparator consisting of the ope-amp. By detecting the data bits (DA0 ~ DA15) when the voltage of the Comp terminal becomes 0 volt, the analog voltage level is changed to 16 bits digital signals which is modulated into the digital IF signal by LSI to record. This signals flows in the sequence of LSIC → LSIA → LSIB → Pre Amp → Head → Tape to record.

The OPL and OPR output signals from LSIC controls automatically the bias voltage level to the Ope-Amp when recording. As the D/A converter handles analog voltage level, all bits of DA0 ~ DA15 becomes 1 when receiving the maximum amplitude voltage of 4.3 volt. Adversely all bits becomes 0 when receiving the minimum voltage of –3 volt.

Normally the offset potential is set so as to make 1000 000 for DA15 ~ 0000 0000 for DA0 at ±0 volt at no signal recording. To avoid fluctuation by supply voltage or temperature, the setting of the offset voltage to ±0 volt is automatically regulated by controlling voltage of the offset bias to the ope-amp by OFL/OFR signals.



To be fixed after adjusted.



Potential regulation by voltage of OFL/OFR

② Analog Playback

Output signal from the head is demodulated into 16 bits parallel signal in LSI after recorded in the sequence of Pre-Amp → LSIB → LSIA → LSIC. The output signal of DA0 ~ DA15 is changed into analog value by D/A converter PCM55. SHI and SHR output signals from LSI-C separate the left and right time-sharing signals through the sample/Hold circuit. The frequency of this sample/hold signal is 48KHz while analog recording, and is 44.1KHz while playihg DAT music tape. The low-pass filter of 20KHz for recording is also used for playing by switching it. To make the fat frequency characteristics, the high-pass area is lowered in the opposite way of recording, and raised a little (3dB up at 20KHz) by the rear aperture compensating circuit.

Finally the signals go to the line-out and the phones jacks.

③ Digital Recording

The digital audio interface signals from the Digital-In jacks go to the LSIC, and extracts the clock pulses in the digital signals from the PLL circuit by the LC oscillation circuited in outside of LSI. Then the signals are converted in to the binary codes by bi-phase circuit through the demodulation circuit, and is recorded in sequence of LSIA → LSIB → Pre-Amp → Head → Tape. Simultaneously the Line-out and Headphone jacks receive signals through the D/A converter for monitoring in the same way of analog playback.

④ Digital Playback

Same as analog playback, the output signals to LSIC are demodulated into bi-phase signal from binary code in LSIC and output from DPOO. Then the digital audio interface signals are output after the voltage level is converted by the pulse transformer through the buffer.

PARTS LIST

MODEL DA-P20

Notes:
1. Parts marked with * require longer delivery time.
2. Parts not shown in the parts lists, or parts, though listed, having no parts numbers, are not general "ready-to supply" parts.

EXPLODED VIEW

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
1	*9A03244900	FRONT CASE-R14,R100085-1	
2	*9A03245000	POWER KNOB-R14,R400188-1	
3	*9A03245100	PLATE,FIXED R400187-1	
4	*9A03245200	B BOTTON-R14,R300176-1	
5	*9A03245300	A BOTTON-R14,R300175-1	
6	*5800983800	HOOK	
7	*9A03245500	C BOTTON-R14,R300177-1	
8	*9A03245600	SCREW,BIND TAPPING M2X5	
9	*9A03245700	LC SPACER-R04,R400146A-1	
10	*9A03245800	SCREW,B-TAP M2.6X8 ZMC-3	
11	*9A03245900	FRONT PANEL-R14,R400184-1	
12	*9A03246200	RVR KNOB L-R14,R300182-1	
13	*9A03246300	SCREW,FLAN.TAP B-T.M1.7X5	
14	*9A03246400	HVR KNOB R14,R300181-1	
15	*9A03263300	KNOB RUBBER L,400189-1	
16	*9A03246500	SCREW,TP PAN TAPPING M2X5	
17	*9A03246600	TOP CASE-R14,R100060A-3	
18	*9A03246700	TERMINAL PLATE, R200112-1	
20	*9A03246800	EJECT BOTTON,R300187-1	
22	*9A03246900	LABLE-R04,R400161B-1	
23	*9A03247000	LID WINDOW-R14,R400148-2	
24	*9A03247100	LID CASSETE,R300008C-4	
25	*9A03247300	SCREW,PAN M1.7X4.8(1420)B	
26	*9A03247400	EJECT CUSHION,R400087A-1	
27	*9A03247500	SCREW, PAN TP M2X4(NI)	
28	*9A03247600	FD SCREW-C10,K41467-1	
29	*9A03247700	FD CUSHION-C10,K41458-1	
30	*9A03247800	FELTING SEAL,K4117-7	
31	*9A03247900	FELTING SEAL,M42037-1	
32	*9A03248000	M2 MECHA. ASSY,DMRA1Z31A	
33	*9A03329200	SLIDE SW. R14,R300186-1	
34	*9A03248200	SCREW,PAN SEMS M2X4 AMC-3	
35	*9A03329300	SUB SHIELD PLATE-R04,R300214-1	
36	*9A03248300	MAIN SHIELD PLATE-R04,R300145-1	
37	*9A03248400	FELTING SEAL,M410499-1	
38	*9A03329400	LUG TERMINAL,SB-43	
39	*9A03247500	SCREW,PAN TP M2X4(NI)	
40	*9A03248600	CHASSIS SUB ASSY,R200079B*1	
41	*9A03248700	SCREW,PAN B-TITE M1.7X4 NI	
42	*9A03248800	CONTACT PLATE,R300099D-1	
43	*9A03248900	BATTERY. SPRING,R400089A-1	
44	*9A03249000	SPACER-A-R04,R400147-1	
45	*9A03247800	FELTING SEAL,K4117-7	
46	*9A03245800	SCREW,B-TAP M2.6X8 ZMC-3	
47	*9A03249100	BO.CASESUB ASSY,R200083A*3	
49	*9A03329500	CUSHION C-R02,R400096B-3	
50	*9A03249300	BATTERY PLATE,R300102-1	
51	*9A03249400	SCREW,CAMERA PAN M1.7X3.5	
52	*9A03249500	RUBBER FOOT,R400041-2	
53	*9A03249600	RUBBER FOOT,R400041-4	
54	*9A03245600	SCREW,BIND TAPPING M2X5	
55	*9A03245800	SCREW,B-TAP M2.6X8 ZMC-3	
56	*9A03249700	RATING PLATE,R400145-3	
57	*9A03250000	RVR KNOB R-R14,R300183-1	
58	*9A03250100	KNOB RUBBER,R400190-1	
59	*9A03250300	CANON CONNECTOR,XLA-3-M01	
60	*9A03250200	TERMINAL PLATE,R4000185-1	
61	*9A03250400	HARNESS SUB ASSY, R400196*1	

Parts marked with *require longer delivery time.

MECHA. PARTS

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
1	*9A03251500	SCREW,MI.7XI.8 UG-I3D-II	
2	*9A03251600	CASSETTE HOLDER(A),SI73-012	
3	*9A03251700	PLATE HOLDER,SCI88-II	
4	*9A03251800	CASSETTE HOLDER(B),SI73-0II	
5	*9A03251900	SCREW,MI.7X2.5 UGI4U-II	
6	*9A03252000	FIXING PLATE,SII5-013	
7	*9A03252100	SCREW,M2.0X4 ZN KGI94-34	
8	*9A03252200	COLLAR LING,SLI90-I2	
9	*9A03252300	RACK DAMPER,SCI8I-I2	
10	*9A03252400	DEW SENSOR,EZ6IG-00	
11	*9A03330300	HOLDER SPRING(L),SLI30-I2	
12	*9A03252600	WASHER,I.7X0.25T FGI23-I4	
13	*9A03252700	SCREW,MI.7X7 NB UGI6E-I5	
14	*9A03252800	DAMPER,SZII5-II	
15	*9A03330400	SCREW,MI.7X3 NI UGI5K-I3	
16	*9A03253000	SENSOR ASSY,S258-022	
17	*9A03330500	T.SENSOR COVER(L),SDI43-II	
18	*9A03330600	ES I.5,KGIII-I8	
19	*9A03253300	CASSETTE SUPPORT,S07I-012	
20	*9A03330700	SENSOR COVER,SDI42-II	
21	*9A03253500	SENSOR ASSY,S258-024	
22	*9A03253600	LID OPENER,SDI35-I5	
23	*9A03253700	FIXER,SII5-014	
24	*9A03330800	HOLDER SPRING(R),SKI3I-I4	
25	*9A03330900	SP HOLDER SUPPORTER,SKI35-II	
26	*9A03331000	SCREW,MI.7X2.5NB FGI64-20	
27	*9A03254100	LOCK SPRING,SKI29-I2	
28	*9A03331100	SCREW,M2.0X2.5NI FGI2I-I2	
29	*9A03254300	E-RING,I.2ZN KGIII-20	
30	*9A03331200	COLLAR RING,SLI90-II	
31	*9A03254500	LDG BELT,SFII5-II	
32	*9A03254600	SCREW,I.7X4.5NBT,UGI7T-II	
33	*9A03254700	MODE SWITCH(T),UEI8E-I2	
34	*9A03331300	WASHER,UJI3N-I6	
35	*9A03254900	WALL WHEEL(L),SNII5-II	
36	*9A03255000	GEAR AL,SNII6-II	
37	*9A03255100	GEAR BL,SNII7-II	
38	*9A03255200	WORM (L),SNII3-II	
39	*9A03255300	PULLEY WORM,SRI2I-I2	
40	*9A03255400	SCREW,M2.0X2 NI FGI2I-I6	
41	*9A03255500	GEAR BASE,S228-013	
42	*9A03255600	MOTOR,S064-014	
43	*9A03255700	SCREW,M2.0X2.5ZN UGIIK-I8	
44	*9A03255800	INTERFACE BOARD,S237-020	
45	*9A03255900	SPPW 52,UEI6C-II	
46	*9A03256000	SPPW 53,UEI8F-II	
47	*9A03256100	RELEASE LEVER SPRING,SKI38-I2	
48	*9A03256200	RELEASE LEVER,SC205-I2	
49	*9A03256300	CYLINDER ASSY,CYKC2W004A	
50	*9A03331400	SCREW,M2.0X8 NI FGI40-26	
51	*9A03256500	SENSOR ASSY,S258-02I	
52	*9A03256600	SCREW,MI.7X2 FGI64-I2	
53	*9A03331500	PI GUIDE ASSY,SQII4-I3	
54	*9A03256800	TENTION ARM ASSY,SKIII-I2	
55	*9A03331600	SPRING,SKII7-I3	
56	*9A03331700	SCREW,M2.0X5 ZN KGI94-35	
57	*9A03257100	SPRING TG-L,SKI22-I2	
58	*9A03331800	WASHER,2.1X0.25 FJI23-20	
59	*9A03331900	SCREW,MI.7X4 ZN UGIIW-II	
60	*9A03257400	GUIDE ROLLER,SQI23-II	

Parts marked with *require longer delivery time.

MECHA. PARTS

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
61	*9A03332000	INCLINER(A),S272-015	
62	*9A03332100	R-PLAY BT SPRING,SK114-15	
63	*9A03257700	SLIDE F/R,SC143-11	
64	*9A03332200	E-RING,2.0ZN KG111-19	
65	*9A03332300	INCLINER(B),S272-016	
66	*9A03332400	HOLD SPRING,SK-121-16	
67	*9A03258100	SPRING HOLDER,SC142-12	
68	*9A03332500	WASHER,1.2X0.25 FJ123-13	
69	*9A03332600	SLIDE SPRING(G),SK132-12	
70	*9A03332700	BREAK SPRING,SK134-12	
71	*9A03332800	SLD ROLLER,SL113-13	
72	*9A03332900	WASHER,1.7X0.25 FJ123-14	
73	*9A03258700	CAM PLATE ASSY,S267-011	
74	*9A03258800	PINCH ROLLER ASSY,SR118-12	
75	*9A03258900	PINCH ROLLER SPRING,SR118-16	
76	*9A03259000	SP ADJUSTER,SC129-12	
77	*9A03259100	SPG PLATE(1),SC119-11	
78	*9A03259200	E-RING,UG13U-12	
79	*9A03333000	SCREW,MI.7X2.5NB UG15K-12	
80	*9A03259400	CHASSIS,S112-012	
81	*9A03259500	SLD COLLAR,SL139-13	
82	*9A03259600	NUT,PI SD157-11	
83	*9A03259700	ROLLER(P),SL230-11	
84	*9A03259800	P2 SPRING,SK139-11	
85	*9A03259900	FLANGE(P),SL231-11	
86	*9A03260000	TG-R SPRING,SK140-12	
87	*9A03260100	BELT,SF111-13	
88	*9A03333100	LDG SPRING(R),SK120-12	
89	*9A03260300	PLATE SPRING,SC120-11	
90	*9A03260400	LDG SPRING(L),SK119-13	
91	*9A03260500	GUIDE BLOCK(A),S182-012	
92	*9A03260600	GUIDE BLOCK(B),S182-011	
93	*9A03260700	CAPSTAN MOTOR,MMFN5Z001A	
95	*9A03333200	LOD COLLAR,SL133-12	
96	*9A03260900	SLIDE PLATE,S137-011	
97	*9A03333300	BT SPRING,SK113-12	
98	*9A03333400	WASHER,UJ12B-11	
99	*9A03261200	REEL ASSY,SR117-21	
100	*9A03261300	CRANK LEVER ASSY,S051-016	
101	*9A03333500	E-RING,3.0 ZU KG111-13	
102	*9A03261500	SENSOR ASSY,S258-023	
103	*9A03333600	CENTER SPRING,SK112-12	
104	*9A03261700	ID GEAR ARM ASSY,SR114-13	
105	*9A03261800	SUB SHASSIS,S127-014	
106	*9A03333700	WASHER,1.4X0.25 FJ111-16	
107	*9A03262000	TU ASSY,SR119-32	
108	*9A03333800	WASHER,0.9X0.25 UJ13M-11	
109	*9A03262200	WASHER,1.7X0.25 FJ111-17	
110	*9A03262300	CENTER PULLEY,SR115-11	
111	*9A03262400	SCREW,MI.7X8 NBT UG17T-12	
112	*9A03262500	SCREW, MI.6X6 ZB UG11W-14	
113	*9A03262600	INTERMEDIAT.GEAR,SN130-11	
114	*9A03262700	WORM WHEEL,SN131-11	
115	*9A03262800	SWITCH ASSY,S042-011	
116	*9A03262900	SCREW,MI.4X1.6NI FG164-32	
117	*9A03263000	MOTOR BRACKET,S149-013	
118	*9A03263100	MOTOR,S064-015	

Parts marked with *require longer delivery time.

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03329600	MAIN PCB ASSY,R100075*1
	*9A03250500	BLANK PCB -MAIN,100080E-1
	*9A03237500	WIRE,SUB ASSY R400155*1
C001	*9A03222200	C.,CHIP TI-2INIER102K-T
C002,004	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C005,007	*9A03222400	C.,CHIP TI-3IPICE105M-T
C010	*9A03222900	C.,CHIP TI-2INIER103K-T
C101	*9A03222600	C.,CHIP TI-2INIEF473Z-T
C102,104	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C105	*9A03222700	C.,CHIP TI-2INIER222K-T
C106	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C107	*9A03222800	C.,CHIP TI-2INIER471K-T
C108,109	*9A03222900	C.,CHIP TI-2INIER103K-T
C110,114	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C116	*9A03223000	C.,CHIP TI-2INIER391K-T
C117	*9A03222900	C.,CHIP TI-2INIER103K-T
C201,202	*9A03223100	C.,CHIP TI-2INIER393K-T
C203,204	*9A03222900	C.,CHIP TI-2INIER103K-T
C205,206	*9A03223200	C.,CHIP TI-2INIER472K-T
C207,208	*9A03223100	C.,CHIP TI-2INIER393K-T
C209,210	*9A03223300	C.,CHIP T2-3INIHCG222J-T
C211,212	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C213,214	*9A03223400	C.,CHIP TI-2INIER332K-T
C215	*9A03223500	C.,CHIP TI-2INIHCG200J-T
C216	*9A03222200	C.,CHIP TI-2INIER102K-T
C217	*9A03223600	C.,CHIP TI-2INIHCG120J-T
C218,221	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C222,223	*9A03222200	C.,CHIP TI-2INIER102K-T
C224	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C250,254	*9A03223100	C.,CHIP TI-2INIER393K-T
C256,319	*9A03223100	C.,CHIP TI-2INIER393K-T
C401	*9A03223700	C.,CHIP TI-2INIHCG221J-T
C402	*9A03223500	C.,CHIP TI-2INIHCG200J-T
C403	*9A03223300	C.,CHIP T2-3INIHCG222J-T
C404	*9A03223700	C.,CHIP TI-2INIHCG221J-T
C405	*9A03223500	C.,CHIP TI-2INIHCG200J-T
C406	*9A03223300	C.,CHIP T2-3INIHCG222J-T
C407	*9A03223800	C.,CHIP TI-2INIHCG121J-T
C408	*9A03223900	C.,FILM APSF-472J100
C409	*9A03223800	C.,CHIP TI-2INIHCG121J-T
C410	*9A03223900	C.,FILM APSF-472J100
C413	*9A03224000	C.,CHIP TI-2INIHCG361J-T
C415	*9A03223700	C.,CHIP TI-2INIHCG221J-T
C416	*9A03224000	C.,CHIP TI-2INIHCG361J-T
C419	*9A03224100	C.,CHIP TI-2INIHCG100D-T
C420	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C421,422	*9A03224200	C.,CHIP T2-3INIER104K-T
C423,426	*9A03224300	C.,CHIP T2-2INIHCG681J-T
C427,432	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C441	*9A03223700	C.,CHIP TI-2INIHCG221J-T
C451,452	*9A03223000	C.,CHIP TI-2INIER391K-T
C490,491	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C493	*9A03224400	C.,CHIP TI-2INIHCG470J-T
C901	*9A03224500	C.,CHIP TI-2INIER152K-T
C902	*9A03223800	C.,CHIP TI-2INIHCG121J-T

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
C903	*9A03224600	C.,CHIP TI-2INIHCG050C-T
C904	*9A03224700	C.,CHIP TI-2INIHCG331J-T
C905	*9A03224400	C.,CHIP TI-2INIHCG470J-T
C907	*9A03224800	C.,CHIP TI-2INIER223K-T
C908	*9A03224900	C.,CHIP TI-2INIHCG070D-T
C909	*9A03223600	C.,CHIP TI-2INIHCG120J-T
C910,911	*9A03224900	C.,CHIP TI-2INIHCG070D-T
C912,913	*9A03222900	C.,CHIP TI-2INIER103K-T
C920	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C931	*9A03223500	C.,CHIP TI-2INIHCG200J-T
C932,934	*9A03222600	C.,CHIP TI-2INIEF473Z-T
CN003	*9A03235800	CONNECTOR,16PIN53020-1610
CN004	*9A03235900	CONNECTOR,10PIN53020-1010
CN005	*9A03236000	PCB CONNECTOR,S8B-ZR
CN006	*9A03236100	PCB CONNECTOR,S9B-ZR
CN007	*9A03236200	PCB CONNECTOR,52080-1510
CN008	*9A03236300	PCB CONNECTOR,S11B-ZR
CN009	*9A03236400	PCB CONNECTOR,S6B-ZR
CN010	*9A03236500	CONNECTOR,18PIN52022-1810
CN012	*9A03236600	PCB CONNECTOR,B7B-PH-K-S
CN013	*9A03236700	PCB CONNECTOR,1L-S-7P-S2T2-EF
CN014	*9A03236800	CONNECTOR,10PIN52022-1010
D001	*9A03226300	CHIP DIODE,MA152WA-(TX)
D002	*9A03226400	CHIP DIODE,MA152WK-(TX)
D003	*9A03226500	CHIP Z.DIODE,02CZ4.3YTE85R
D004	*9A03226600	CHIP DIODE,MA152A-(TX)
D101	*9A03226300	CHIP DIODE,MA152WA-(TX)
D102,105	*9A03226600	CHIP DIODE,MA152A-(TX)
D201	*9A03226700	CHIP Z.DIODE,02CZ5.6YTE85R
D202	*9A03226800	CHIP DIODE,MA159A-(TX)
D203	*9A03226600	CHIP DIODE,MA152A-(TX)
D301,401	*9A03226600	CHIP DIODE,MA152A-(TX)
D901,904	*9A03226600	CHIP DIODE,MA152A-(TX)
DE001,002	*9A03225000	C.,ELEC 16RC2-100-FI
DE003	*9A03225100	C.,CHIP ELEC MF6.3FC10
DE004	*9A03225200	C.,CHIP ELEC ECE-V1AV330WR
DE005	*9A03225100	C.,CHIP ELEC MF6.3FC10
DE006,007	*9A03225000	C.,ELEC 16RC2-100-FI
DE008	*9A03225300	C.,CHIP ELEC MF16FC10
DE101	*9A03225400	C.,CHIP ELEC MF50FC1
DE102	*9A03225100	C.,CHIP ELEC MF6.3FC10
DE103,105	*9A03225300	C.,CHIP ELEC MF16FC10
DE106	*9A03225500	C.,CHIP ELEC MF6.3FC47
DE107	*9A03225400	C.,CHIP ELEC MF50FC1
DE108,109	*9A03225500	C.,CHIP ELEC MF6.3FC47
DE110,112	*9A03225400	C.,CHIP ELEC MF50FC1
DE113,115	*9A03225200	C.,CHIP ELEC ECE-V1AV330WR
DE116	*9A03225600	C.,CHIP ELEC ECE-V1CV220WR
DE117,118	*9A03225400	C.,CHIP ELEC MF50FC1
DE201	*9A03225700	C.,ELEC 16RC2-47-FI
DE202	*9A03225800	C.,CHIP TANTAL ECST0JY335R
DE203	*9A03225400	C.,CHIP ELEC MF50FC1
DE204	*9A03225800	C.,CHIP TANTAL ECST0JY335R
DE402BP	*9A03225900	C.,CHIP ELEC MF6.3FC22BP
DE403BP	*9A03226000	C.,ELEC 6.3RBPA-22

Parts marked with *require longer delivery time.

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
DE404BP	*9A03226000	C.,ELEC 6.3RBPA-22
DE409BP	*9A03225900	C.,CHIP ELEC MF6.3FC22BP
DE410,411	*9A03225800	C.,CHIP TANTAL ECSTOJY335R
DE902,904	*9A03225100	C.,CHIP ELEC MF6.3FC10
DE905	*9A03226100	C.,CHIP ELEC MF6.3FC33
DE910	*9A03225100	C.,CHIP ELEC MF6.3FC10
DE913	*9A03226200	C.,TANTAL ECSTOJC226R
DP911BP	*9A03225900	C.,CHIP ELEC MF6.3FC22BP
DP912BP	*9A03225900	C.,CHIP ELEC MF6.3FC22BP
IC001	*9A03220400	IC.,S81250HG-RD-TI
IC002	*9A03220200	IC.,M5236ML-TI
IC003,004	*9A03220300	IC.,NJM4558M-TI
IC101	*9A03220500	IC.,HA13403
IC102	*9A03220600	IC.,UPD4053BG-TI
IC103	*9A03220700	IC.,UPC4082G2-TI
IC104	*9A03220800	IC.,NJM2903M-TI
IC105	*9A03220300	IC.,NJM4558M-TI
IC106	*9A03220900	IC.,HA13403MP-EL
IC107	*9A03221000	IC.,TC74HC86AF-TI
IC108	*9A03221100	IC.,UPC4572G2-TI
IC201	*9A03221200	IC.,M5469FP-TI
IC202	*9A03220800	IC.,NJM2903M-TI
IC203	*9A03221300	IC.,HM65256BLFP15T
IC204	*9A03221400	IC.,UPD74HC02G-TI
IC401	*9A03221500	IC.,PQM55HP
IC402,403	*9A03221600	IC.,M5201FP-TI
IC404,406	*9A03221700	IC.,NJM2068M-TI
IC407	*9A03220600	IC.,UPD4053BG-TI
IC408	*9A03220700	IC.,UPC4082G2-TI
IC409	*9A03220600	IC.,UPD4053BG-TI
IC410	*9A03220700	IC.,UPC4082G2-TI
IC411	*9A03220600	IC.,UPD4053BG-TI
IC412	*9A03221800	IC.,UPC4072G2-TI
IC413	*9A03221900	IC.,NJM311M-TI
IC901	*9A03222000	IC.,NJM4560M-TI
IC902,903	*9A03222100	IC.,UPD74HCU04G-TI
IC904	*9A03221700	IC.,NJM2068M-TI
JK100	*9A03236900	DC JACK,JDJ-010-01
JK101	*9A03237000	PIN JACK,JPJ0811-01-832
JK102,103	*9A03237100	PIN JACK,YKB11-0771
L001	*9A03226900	CHIP INDUCTOR,ELJ-FA101KF
L201	*9A03227000	CHIP INDUCTOR,ELJ-FA2R2KF
L901	*9A03227100	CHIP INDUCTOR,ELJ-FA5R6KF
L902	*9A03227200	TRANS,PULSE PT10-CA-001
L903,905	*9A03226900	CHIP INDUCTOR,ELJ-FA101KF
L906,908	*9A03227300	CHIP INDUCTOR,BLM21A5PT
LPF-L	*9A03227400	LOWPASS FILTET,LPF-R002-20K
LPF-R	*9A03227400	LOWPASS FILTER,LPF-R002-20K
LSIA	*9A03219900	LSI.,HD62004A
LSIB	*9A03220000	LSI.,HD62014A
LSIC	*9A03220100	LSI.,TC110G08AF-0205
R001	*9A03227500	R.,METAL CRH200FH24-J-8.2
R003	*9A03227600	R.,METAL CRH200FH24-J-18
R004	*9A03227700	R.,CHIP MCR10EZHJ472
R005,006	*9A03227800	R.,CHIP MCR10EZHJ102

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R007	*9A03227900	R.,CHIP MCR10EZHJ221
R008	*9A03228000	R.,CHIP MCR10EZHJ103
R009	*9A03228100	R.,CHIP MCR10EZHJ273
R010,011	*9A03228200	R.,CHIP MCR10EZHJ224
R012	*9A03228300	R.,CHIP RMC1/10D332FTP
R013	*9A03228400	R.,CHIP RMC1/10D182FTP
R014	*9A03228300	R.,CHIP RMC1/10D332FTP
R015	*9A03228500	R.,CHIP RMC1/10D222FTP
R016	*9A03228600	R.,CHIP MCR10EZHJ334
R017	*9A03228700	R.,CHIP MCR10EZHJ104
R018	*9A03229500	R.,CHIP MCR10EZHJ473
R019	*9A03228900	R.,CHIP MCR10EZHJ122
R020	*9A03229000	R.,CHIP MCR10EZHJ562
R021	*9A03229100	R.,CHIP RNC1/16E103DTP
R022	*9A03229200	R.,CHIP RNC1/16E363DTP
R023	*9A03229300	R.,CHIP RNC1/16E103DTP
R024	*9A03229200	R.,CHIP RNC1/16E363DTP
R025	*9A03228000	R.,CHIP MCR10EZHJ103
R026,027	*9A03229100	R.,CHIP RNC1/16E103DTP
R028	*9A03229000	R.,CHIP MCR10EZHJ562
R029	*9A03228900	R.,CHIP MCR10EZHJ122
R030	*9A03229400	R.,CHIP MCR10EZHJ101
R031	*9A03229500	R.,CHIP MCR10EZHJ473
R032	*9A03229600	R.,CHIP RMC1/10D622FTP
R035	*9A03228000	R.,CHIP MCR10EZHJ103
R101	*9A03229400	R.,CHIP MCR10EZHJ101
R102	*9A03228000	R.,CHIP MCR10EZHJ103
R103	*9A03229700	R.,CHIP MCR10EZHJ822
R104	*9A03228600	R.,CHIP MCR10EZHJ334
R105	*9A03227800	R.,CHIP MCR10EZHJ102
R106	*9A03229800	R.,CHIP MCR10EZHJ392
R107	*9A03227700	R.,CHIP MCR10EZHJ472
R108	*9A03229900	R.,CHIP MCR10EZHJ563
R109	*9A03227700	R.,CHIP MCR10EZHJ472
R110	*9A03230000	R.,CHIP MCR10EZHJ331
R111	*9A03230100	R.,CHIP MCR25JZHJ1R0
R115,116	*9A03230200	R.,CHIP MCR10EZHJ681
R117,118	*9A03230300	R.,CHIP MCR10EZHJ222
R119,120	*9A03230400	R.,CHIP RNC1/16E332DTP
R121	*9A03230500	R.,CHIP MCR10EZHJ184
R122	*9A03228700	R.,CHIP MCR10EZHJ104
R123,124	*9A03230600	R.,CHIP RMC1/10D104FTP
R125,126	*9A03228200	R.,CHIP MCR10EZHJ224
R127	*9A03230500	R.,CHIP MCR10EZHJ184
R128	*9A03229800	R.,CHIP MCR10EZHJ392
R129	*9A03230700	R.,CHIP MCR10EZHJ244
R130	*9A03230800	R.,CHIP MCR10EZHJ914
R131	*9A03228200	R.,CHIP MCR10EZHJ224
R133,134	*9A03228700	R.,CHIP MCR10EZHJ104
R135	*9A03230900	R.,CHIP MCR10EZHJ754
R136	*9A03231000	R.,CHIP MCR10EZHJ105
R137,138	*9A03231100	R.,CHIP RMC1/10D103FTP
R139	*9A03231200	R.,CHIP RMC1/10D123FTP
R140	*9A03231100	R.,CHIP RMC1/10D103FTP
R141	*9A03228700	R.,CHIP MCR10EZHJ104

Parts marked with *require longer delivery time.

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R142	*9A03229500	R.,CHIP MCR10EZHJ473
R143	*9A03228700	R.,CHIP MCR10EZHJ104
R144	*9A03230300	R.,CHIP MCR10EZHJ222
R145	*9A03228000	R.,CHIP MCR10EZHJ103
R146	*9A03228100	R.,CHIP MCR10EZHJ273
R147	*9A03231300	R.,CHIP MCR10EZHJ474
R148	*9A03228100	R.,CHIP MCR10EZHJ273
R149	*9A03230300	R.,CHIP MCR10EZHJ222
R150	*9A03231300	R.,CHIP MCR10EZHJ474
R151	*9A03231400	R.,CHIP MCR10EZHJ153
R152,153	*9A03231500	R.,CHIP MCR10EZHJ124
R154	*9A03230400	R.,CHIP RNC1/16E332DTP
R155	*9A03228200	R.,CHIP MCR10EZHJ224
R156	*9A03229500	R.,CHIP MCR10EZHJ473
R157	*9A03230400	R.,CHIP RNC1/16E332DTP
R158	*9A03228200	R.,CHIP MCR10EZHJ224
R159	*9A03229500	R.,CHIP MCR10EZHJ473
R160,161	*9A03228700	R.,CHIP MCR10EZHJ104
R162	*9A03229400	R.,CHIP MCR10EZHJ101
R164	*9A03231600	R.,CHIP MCR50JZHJ2R2
R165,166	*9A03227800	R.,CHIP MCR10EZHJ102
R167,168	*9A03230000	R.,CHIP MCR10EZHJ331
R169	*9A03231700	R.,CHIP MCR10EZHJ332
R170,171	*9A03230300	R.,CHIP MCR10EZHJ222
R172	*9A03231000	R.,CHIP MCR10EZHJ105
R173	*9A03227700	R.,CHIP MCR10EZHJ472
R174	*9A03231800	R.,CHIP MCR10EZHJ152
R175	*9A03230300	R.,CHIP MCR10EZHJ222
R176	*9A03227700	R.,CHIP MCR10EZHJ472
R177	*9A03231300	R.,CHIP MCR10EZHJ474
R178	*9A03228700	R.,CHIP MCR10EZHJ104
R179	*9A03231900	R.,CHIP MCR10EZHJ823
R180	*9A03230500	R.,CHIP MCR10EZHJ184
R181	*9A03231700	R.,CHIP MCR10EZHJ332
R182	*9A03231400	R.,CHIP MCR10EZHJ153
R183	*9A03227700	R.,CHIP MCR10EZHJ472
R184	*9A03231300	R.,CHIP MCR10EZHJ474
R185	*9A03232000	R.,CHIP MCR10EZHJ154
R186	*9A03227700	R.,CHIP MCR10EZHJ472
R187	*9A03231300	R.,CHIP MCR10EZHJ474
R188	*9A03232100	R.,CHIP RMC1/10D682FTP
R201	*9A03227800	R.,CHIP MCR10EZHJ102
R202	*9A03232200	R.,CHIP MCR10EZHJ123
R203	*9A03228000	R.,CHIP MCR10EZHJ103
R204	*9A03231400	R.,CHIP MCR10EZHJ153
R205	*9A03232200	R.,CHIP MCR10EZHJ123
R206	*9A03229700	R.,CHIP MCR10EZHJ822
R207	*9A03232300	R.,CHIP MCR10EZHJ682
R208	*9A03232200	R.,CHIP MCR10EZHJ123
R209	*9A03228000	R.,CHIP MCR10EZHJ103
R210,212	*9A03227800	R.,CHIP MCR10EZHJ102
R213	*9A03232400	R.,CHIP MCR10EZHJ271
R215	*9A03229500	R.,CHIP MCR10EZHJ473
R216	*9A03228700	R.,CHIP MCR10EZHJ104
R217	*9A03229500	R.,CHIP MCR10EZHJ473

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R218	*9A03228700	R.,CHIP MCR10EZHJ104
R219	*9A03229500	R.,CHIP MCR10EZHJ473
R220	*9A03228700	R.,CHIP MCR10EZHJ104
R223	*9A03228000	R.,CHIP MCR10EZHJ103
R224	*9A03231300	R.,CHIP MCR10EZHJ474
R225	*9A03229900	R.,CHIP MCR10EZHJ563
R226,227	*9A03232500	R.,CHIP MCR10EZHJ393
R228	*9A03228000	R.,CHIP MCR10EZHJ103
R229	*9A03231300	R.,CHIP MCR10EZHJ474
R230	*9A03229900	R.,CHIP MCR10EZHJ563
R231,232	*9A03232500	R.,CHIP MCR10EZHJ393
R234	*9A03227800	R.,CHIP MCR10EZHJ102
R236	*9A03229500	R.,CHIP MCR10EZHJ473
R238,240	*9A03229500	R.,CHIP MCR10EZHJ473
R241	*9A03232500	R.,CHIP MCR10EZHJ393
R242	*9A03232400	R.,CHIP MCR10EZHJ271
R243,244	*9A03232600	R.,CHIP MCR10EZHJ333
R245	*9A03231000	R.,CHIP MCR10EZHJ105
R246	*9A03227900	R.,CHIP MCR10EZHJ221
R247	*9A03230000	R.,CHIP MCR10EZHJ331
R250,254	*9A03229500	R.,CHIP MCR10EZHJ473
R260	*9A03227900	R.,CHIP MCR10EZHJ221
R334	*9A03232600	R.,CHIP MCR10EZHJ333
R335	*9A03228700	R.,CHIP MCR10EZHJ104
R336	*9A03228000	R.,CHIP MCR10EZHJ103
R338,339	*9A03228300	R.,CHIP RMC1/10D332FTP
R403	*9A03227800	R.,CHIP MCR10EZHJ102
R404	*9A03232700	R.,CHIP RNC1/16E563DTP
R405	*9A03232800	R.,CHIP RNC1/16E223DTP
R406	*9A03232900	R.,CHIP RNC1/16E682DTP
R407	*9A03227800	R.,CHIP MCR10EZHJ102
R408	*9A03232700	R.,CHIP RNC1/16E563DTP
R409	*9A03232800	R.,CHIP RNC1/16E223DTP
R410	*9A03232900	R.,CHIP RNC1/16E682DTP
R411	*9A03230400	R.,CHIP RNC1/16E332DTP
R412	*9A03233100	R.,CHIP RNC1/16E182DTP
R413	*9A03233200	R.,CHIP RNC1/16E472DTP
R414	*9A03233300	R.,CHIP RNC1/16E562DTP
R415	*9A03233400	R.,CHIP RNC1/16E123DTP
R416	*9A03230200	R.,CHIP MCR10EZHJ681
R417	*9A03232900	R.,CHIP RNC1/16E682DTP
R418,419	*9A03233500	R.,CHIP RNC1/16E153DTP
R421	*9A03230400	R.,CHIP RNC1/16E332DTP
R422	*9A03233600	R.,CHIP MCR10EZHJ684
R423	*9A03230300	R.,CHIP MCR10EZHJ222
R424	*9A03230400	R.,CHIP RNC1/16E332DTP
R425	*9A03233100	R.,CHIP RNC1/16E182DTP
R426	*9A03233200	R.,CHIP RNC1/16E472DTP
R427	*9A03233300	R.,CHIP RNC1/16E562DTP
R428	*9A03233400	R.,CHIP RNC1/16E123DTP
R429	*9A03230400	R.,CHIP RNC1/16E332DTP
R430	*9A03232900	R.,CHIP RNC1/16E682DTP
R431,432	*9A03233500	R.,CHIP RNC1/16E153DTP
R434	*9A03230200	R.,CHIP MCR10EZHJ681
R435	*9A03233600	R.,CHIP MCR10EZHJ684

Parts marked with *require longer delivery time.

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R436	*9A03230300	R.,CHIP MCR10EZHJ222
R438,439	*9A03230400	R.,CHIP RNC1/16E332DTP
R441	*9A03230400	R.,CHIP RNC1/16E332DTP
R442	*9A03229100	R.,CHIP RNC1/16E103DTP
R447,449	*9A03230400	R.,CHIP RNC1/16E332DTP
R452	*9A03229100	R.,CHIP RNC1/16E103DTP
R456,457	*9A03233200	R.,CHIP RNC1/16E472DTP
R458	*9A03231000	R.,CHIP MCR10EZHJ105
R459,460	*9A03228000	R.,CHIP MCR10EZHJ103
R461	*9A03229500	R.,CHIP MCR10EZHJ473
R462	*9A03231800	R.,CHIP MCR10EZHJ152
R463	*9A03229500	R.,CHIP MCR10EZHJ473
R468	*9A03232900	R.,CHIP RNC1/16E682DTP
R469	*9A03233200	R.,CHIP RNC1/16E472DTP
R470	*9A03227700	R.,CHIP MCR10EZHJ472
R471	*9A03232900	R.,CHIP RNC1/16E682DTP
R472	*9A03233200	R.,CHIP RNC1/16E472DTP
R473	*9A03227700	R.,CHIP MCR10EZHJ472
R474	*9A03227900	R.,CHIP MCR10EZHJ221
R475	*9A03230300	R.,CHIP MCR10EZHJ222
R476	*9A03227900	R.,CHIP MCR10EZHJ221
R477,480	*9A03230300	R.,CHIP MCR10EZHJ222
R481	*9A03230700	R.,CHIP MCR10EZHJ244
R490	*9A03229100	R.,CHIP RNC1/16E103DTP
R492,493	*9A03228000	R.,CHIP MCR10EZHJ103
R494	*9A03229100	R.,CHIP RNC1/16E103DTP
R901	*9A03227800	R.,CHIP MCR10EZHJ102
R903	*9A03227700	R.,CHIP MCR10EZHJ472
R904	*9A03227800	R.,CHIP MCR10EZHJ102
R905	*9A03231700	R.,CHIP MCR10EZHJ332
R906	*9A03228000	R.,CHIP MCR10EZHJ103
R907	*9A03227800	R.,CHIP MCR10EZHJ102
R908,909	*9A03231100	R.,CHIP RMC1/10D103FTP
R910	*9A03228700	R.,CHIP MCR10EZHJ104
R911	*9A03231300	R.,CHIP MCR10EZHJ474
R912	*9A03231100	R.,CHIP RMC1/10D103FTP
R913	*9A03228700	R.,CHIP MCR10EZHJ104
R914,915	*9A03231000	R.,CHIP MCR10EZHJ105
R916	*9A03231100	R.,CHIP RMC1/10D103FTP
R920	*9A03233700	R.,CHIP MCR10EZHJ750
R920	*9A03230600	R.,CHIP RMC1/10D104FTP
R921	*9A03233700	R.,CHIP MCR10EZHJ750
R921	*9A03230600	R.,CHIP RMC1/10D104FTP
R922,923	*9A03233800	R.,CHIP MCR10EZHJ204
R924,925	*9A03233900	R.,CHIP RMC1/10D204FTP
R926,927	*9A03231000	R.,CHIP MCR10EZHJ105
R928,929	*9A03229800	R.,CHIP MCR10EZHJ392
R930	*9A03229500	R.,CHIP MCR10EZHJ473
R940	*9A03231000	R.,CHIP MCR10EZHJ105
R941	*9A03231000	R.,CHIP MCR10EZHJ105
R941	*9A03227800	R.,CHIP MCR10EZHJ102
R942	*9A03230200	R.,CHIP MCR10EZHJ681
RL100	*9A03237200	RELAY,AG8029
SW100	*9A03237300	SLIDE SWITCH,SSD-22DP
T001	*9A03234000	CHIP TR.,2SB1114-T1-ZL

MAIN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
T002	*9A03234100	CHIP TR.,2SA1037K-T146R
T003	*9A03234600	CHIP TR.,2SD1614-T1-XL
T004	*9A03234300	CHIP TR.,2SB1203S-CCC-FA
T005	*9A03234400	CHIP TR.,DTC124EK-T146
T006	*9A03234000	CHIP TR.,2SB1114-T1-ZL
T007	*9A03234600	CHIP TR.,2SD1614-T1-XL
T008	*9A03234700	CHIP TR.,DTA124EK-T146
T009	*9A03234800	CHIP TR.,DTA144TK-T146
T101	*9A03234900	CHIP TR.,2SD1048X7-TB
T102,103	*9A03234100	CHIP TR.,2SA1037K-T146R
T104,108	*9A03235000	CHIP TR.,2SC2412K-T146R
T201,203	*9A03234700	CHIP TR.,DTA124EK-T146
T401,402	*9A03234900	CHIP TR.,2SD1048X7-TB
T405	*9A03235100	CHIP TR.,DTA143TK-T146
T406	*9A03234400	CHIP TR.,DTC124EK-T146
T407	*9A03234700	CHIP TR.,DTA124EK-T146
T408	*9A03235200	CHIP TR.,DTC144TK-T146
T409	*9A03234700	CHIP TR.,DTA124EK-T146
T411,414	*9A03234900	CHIP TR.,2SD1048X7-TB
T415	*9A03235000	CHIP TR.,2SC2412K-T146R
T901,902	*9A03234900	CHIP TR.,2SD1048X7-TB
VCD1	*9A03237400	DIODE,1SV149C
VR001	*9A03235300	CHIP VR,SEMI EVM-6PSW00B14
VR002	*9A03235400	CHIP VR,SEMI EMV-6PSW00B35
X001	*9A03235500	OSC,CRYSITL AT49-28.224MH
X002	*9A03235600	OSC,CRYSITL AT49-11.2896M
X003	*9A03235700	OSC,CRYSITL AT49-12.288MH

SUB PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03329900	SUB PCB ASSY,R200118*1
	*9A03250600	BLANK PCB -SUB,R300201-1
	*9A03244600	UP CONNECTOR 6P,W-P7506-11
	*9A03244700	SUB CONNECOR 7P,IL-7P-12-R04
	*9A03249800	SPACER S-R04,R400150-1
C1	*9A03222300	C.,CHIP T1-21N1EF104Z-T
DE1,2	*9A03243900	C.,ELEC 16RNBBP4R7-F
IC101	*9A03221100	IC.,UPC4572G2-T1
R1	*9A03244000	R.,CHIP RNC1/16E102DTP
R2,3	*9A03233200	R.,CHIP RNC1/16E472DTP
R4	*9A03244100	R.,CHIP RNC1/16E512DTP
R5,6	*9A03233200	R.,CHIP RNC1/16E472DTP
R7	*9A03244000	R.,CHIP RNC1/16E102DTP
R8,13	*9A03244100	R.,CHIP RNC1/16E512DTP
R14	*9A03244200	R.,CHIP MCR10EZHF1803
R15,16	*9A03244100	R.,CHIP RNC1/16E512DTP
R17,18	*9A03244200	R.,CHIP MCR10EZHF1803
R19	*9A03244100	R.,CHIP RNC1/16E512DTP
R20	*9A03244200	R.,CHIP MCR10EZHF1803
R21,22	*9A03244300	R.,CHIP MCR10EZHF5603
REC VOL	*9A03244400	VR,RK12422-L13-50KAX2
SW1,2	*9A03244500	SLIDE SW.,SSSF143-L6-NS

Parts marked with *require longer delivery time.

CN PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03329700	CN PCB ASSY,2B-CN3
	*9A03250700	BLANK PCB -SET,R200077B-1
	*9A03239200	LCD,FRD-6F68P
	*9A03249900	CUSHION,F-R04 R400096-6
C001	*9A03224800	C.,CHIP TI-21NIER223K-T
C002	*9A03222900	C.,CHIP TI-21NIER103K-T
C003,004	*9A03237800	C.,CHIP TI-21NIHCG330J-T
C005,010	*9A03222300	C.,CHIP TI-21NIEF104Z-T
C013	*9A03222900	C.,CHIP TI-21NIER103K-T
C014	*9A03222400	C.,CHIP TI-31PICE105M-T
C020	*9A03224300	C.,CHIP T2-21NIHCG681J-T
CN100	*9A03236800	CONNECTOR,10P 52022-1010
CN101	*9A03238500	CONNECTOR,16P 52022-1610
CN102	*9A03238600	PCB CONNECTOR,B6B-ZR
CN103	*9A03238700	PCB CONNECTOR,B10B-ZR
D001	*9A03226800	CHIP DIODE,MA159A-(TX)
D001	*9A03237900	CHIP DIODE,DSA010
D002	*9A03226400	CHIP DIODE,MA152WK-(TX)
D003	*9A03226600	CHIP DIODE,MA152A-(TX)
D004,005	*9A03226300	CHIP DIODE,MA152WA-(TX)
D006	*9A03226800	CHIP DIODE,MA159A-(TX)
D007,011	*9A03226300	CHIP DIODE,MA152WA-(TX)
IC001	*9A03237600	IC.,NJM2901M-TI
IC002	*9A03237700	LSI,UPD75312GF-052
LED001	*9A03238800	LED,LN222RP
R001	*9A03238000	R.,CHIP RMCI/10D393FTP
R002	*9A03238100	R.,CHIP RMCI/10D224FTP
R003	*9A03228200	R.,CHIP MCR10EZHJ224
R004	*9A03229500	R.,CHIP MCR10EZHJ473
R005,007	*9A03232000	R.,CHIP MCR10EZHJ154
R008	*9A03238200	R.,CHIP MCR10EZHJ561
R010	*9A03228700	R.,CHIP MCR10EZHJ104
R011	*9A03232500	R.,CHIP MCR10EZHJ393
R012	*9A03229500	R.,CHIP MCR10EZHJ473
R013	*9A03231300	R.,CHIP MCR10EZHJ474
R014	*9A03228700	R.,CHIP MCR10EZHJ104
R015	*9A03229700	R.,CHIP MCR10EZHJ822
R016	*9A03228700	R.,CHIP MCR10EZHJ104
R017	*9A03231400	R.,CHIP MCR10EZHJ153
R018	*9A03229500	R.,CHIP MCR10EZHJ473
R019	*9A03231000	R.,CHIP MCR10EZHJ105
R020	*9A03228200	R.,CHIP MCR10EZHJ224
R021	*9A03229500	R.,CHIP MCR10EZHJ473
R022	*9A03231000	R.,CHIP MCR10EZHJ105
R023	*9A03228200	R.,CHIP MCR10EZHJ224
R024,025	*9A03231100	R.,CHIP RMCI/10D103FTP
R026	*9A03229500	R.,CHIP MCR10EZHJ473
R027	*9A03230600	R.,CHIP RMCI/10D104FTP
R028	*9A03238300	R.,CHIP MCR10EZHJ391
R029	*9A03238400	R.,CHIP RMCI/10D124FTP
R040	*9A03228700	R.,CHIP MCR10EZHJ104
R041	*9A03231300	R.,CHIP MCR10EZHJ474
R042,044	*9A03228700	R.,CHIP MCR10EZHJ104
SW100	*9A03238900	PUSH SWITCH,EVQ-QS204B
SW101	*9A03239000	SLIDE SWITCH,ESD-100121
T001	*9A03234100	CHIP TR.,2SA1037K-T146R
T002,004	*9A03235200	CHIP TR.,DTC144TK-T146
T005	*9A03234100	CHIP TR.,2SA1037K-T146R
T006,008	*9A03234800	CHIP TR.,DTA144TK-T146
X100	*9A03239100	OSC,CERAMIC CSA4.19MG

ATF PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03329800	ATF PCB ASSY,2B-ATF3
	*9A03250700	BLANK PCB -SET,R200077B-1
C001	*9A03222700	C.,CHIP TI-21NIER222K-T
C002	*9A03239300	C.,CHIP TI-21NIHCG471J-T
C003	*9A03222200	C.,CHIP TI-21NIER102K-T
C004	*9A03224500	C.,CHIP TI-21NIER152K-T
C005,006	*9A03222300	C.,CHIP TI-21NIEF104Z-T
C007,008	*9A03239400	C.,CHIP TI-21NIER122K-T
C009	*9A03239500	C.,CHIP TI-21NIER271K-T
C010	*9A03239600	C.,CHIP TI-21NIER561K-T
C011,013	*9A03222200	C.,CHIP TI-21NIER102K-T
C014	*9A03222300	C.,CHIP TI-21NIEF104Z-T
C015	*9A03224800	C.,CHIP TI-21NIER223K-T
C016,017	*9A03239700	C.,CHIP TI-21NIER333K-T
C018,019	*9A03223000	C.,CHIP TI-21NIER391K-T
C020	*9A03239800	C.,CHIP TI-21PIHE104M-T
CN100	*9A03235900	CONNECTOR,10P 53020-1010
DE001	*9A03225100	C.,CHIP ELEC MF6.3FC10
IC001	*9A03220700	IC.,UPC4082G2-TI
L001	*9A03239900	CHIP INDUCTOR,ELJ-FB102KF
R001	*9A03230300	R.,CHIP MCR10EZHJ222
R002,003	*9A03227800	R.,CHIP MCR10EZHJ102
R004	*9A03231700	R.,CHIP MCR10EZHJ332
R005	*9A03240000	R.,CHIP MCR10EZHJ223
R006	*9A03240100	R.,CHIP MCR10EZHJ151
R007	*9A03231700	R.,CHIP MCR10EZHJ332
R008	*9A03227900	R.,CHIP MCR10EZHJ221
R009	*9A03229800	R.,CHIP MCR10EZHJ392
R010	*9A03238200	R.,CHIP MCR10EZHJ561
R011	*9A03227700	R.,CHIP MCR10EZHJ472
R012	*9A03228000	R.,CHIP MCR10EZHJ103
R013	*9A03240200	R.,CHIP MCR10EZHJ134
R014	*9A03228600	R.,CHIP MCR10EZHJ334
R015	*9A03228000	R.,CHIP MCR10EZHJ103
R016	*9A03229400	R.,CHIP MCR10EZHJ101
R017	*9A03229700	R.,CHIP MCR10EZHJ822
R018	*9A03232400	R.,CHIP MCR10EZHJ271
R019	*9A03229000	R.,CHIP MCR10EZHJ562
R020	*9A03229500	R.,CHIP MCR10EZHJ473
R021	*9A03230300	R.,CHIP MCR10EZHJ222
R022,023	*9A03228000	R.,CHIP MCR10EZHJ103
R024	*9A03227700	R.,CHIP MCR10EZHJ472
R025	*9A03229500	R.,CHIP MCR10EZHJ473
R026	*9A03228300	R.,CHIP RMCI/10D332FTP
R027	*9A03228500	R.,CHIP RMCI/10D222FTP
R028	*9A03240000	R.,CHIP MCR10EZHJ223
R029	*9A03240300	R.,CHIP MCR10EZHJ511
R030	*9A03229500	R.,CHIP MCR10EZHJ473
R031	*9A03240000	R.,CHIP MCR10EZHJ223
R032	*9A03232600	R.,CHIP MCR10EZHJ333
R033,035	*9A03230300	R.,CHIP MCR10EZHJ222
R036	*9A03232500	R.,CHIP MCR10EZHJ393
R037	*9A03231800	R.,CHIP MCR10EZHJ152
R038	*9A03240400	R.,CHIP MCR10EZHJ113
R039	*9A03240500	R.,CHIP MCR10EZHJ821
R040	*9A03230300	R.,CHIP MCR10EZHJ222
R041,043	*9A03240600	R.,CHIP MCR10EZHJ471
R044	*9A03229500	R.,CHIP MCR10EZHJ473
R045	*9A03240600	R.,CHIP MCR10EZHJ471
R046	*9A03238200	R.,CHIP MCR10EZHJ561

Parts marked with *require longer delivery time.

ATF PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R047	*9A03240700	R.,CHIP MCR10EZHJ243
R048	*9A03227900	R.,CHIP MCR10EZHJ221
R049	*9A03228000	R.,CHIP MCR10EZHJ103
R050,051	*9A03231400	R.,CHIP MCR10EZHJ153
R052	*9A03228000	R.,CHIP MCR10EZHJ103
R053,054	*9A03238300	R.,CHIP MCR10EZHJ391
R055	*9A03229500	R.,CHIP MCR10EZHJ473
R056	*9A03231300	R.,CHIP MCR10EZHJ474
R057	*9A03228600	R.,CHIP MCR10EZHJ334
R058	*9A03227700	R.,CHIP MCR10EZHJ472
T001,005	*9A03235000	CHIP TR.,2SC2412K-T146R
T006,008	*9A03234100	CHIP TR.,2SA1037K-T146R
T009	*9A03234900	CHIP TR.,2SD1048X7-TB
T010	*9A03234100	CHIP TR.,2SA1037K-T146R
T011	*9A03234800	CHIP TR.,DTA144TK-T146
T012,014	*9A03235000	CHIP TR.,2SC2412K-T146R
T015	*9A03234100	CHIP TR.,2SA1037K-T146R
T016,018	*9A03235000	CHIP TR.,2SC2412K-T146R
T019	*9A03234100	CHIP TR.,2SA1037K-T146R

PRE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03330000	PRE PCB ASSY,2B-PRE3
	*9A03250700	BLANK PCB -SET,R200077B-1
C003,004	*9A03223400	C.,CHIP TI-2INIER332K-T
C005,006	*9A03241000	C.,CHIP TI-2INIER821K-T
C007	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C008	*9A03222200	C.,CHIP TI-2INIER102K-T
C009	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C010	*9A03241000	C.,CHIP TI-2INIER821K-T
C011	*9A03222900	C.,CHIP TI-2INIER103K-T
C012,015	*9A03223100	C.,CHIP TI-2INIER393K-T
C016,017	*9A03222900	C.,CHIP TI-2INIER103K-T
C018	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C019	*9A03222900	C.,CHIP TI-2INIER103K-T
C021	*9A03224800	C.,CHIP TI-2INIER223K-T
C022	*9A03223100	C.,CHIP TI-2INIER393K-T
C023	*9A03224500	C.,CHIP TI-2INIER152K-T
C024	*9A03241100	C.,CHIP TI-2INIHCG750J-T
C025,026	*9A03241200	C.,CHIP TI-2INIHCG151J-T
C027	*9A03241100	C.,CHIP TI-2INIHCG750J-T
C028	*9A03224800	C.,CHIP TI-2INIER223K-T
C029	*9A03241300	C.,CHIP TI-2INIHCG820J-T
C030	*9A03241400	C.,CHIP TI-2INIHCG390J-T
C031,032	*9A03222900	C.,CHIP TI-2INIER103K-T
C033	*9A03222400	C.,CHIP TI-3IPICE105M-T
C034,035	*9A03222900	C.,CHIP TI-2INIER103K-T
C036	*9A03237800	C.,CHIP TI-2INIHCG330J-T
C037	*9A03241500	C.,CHIP TI-2INIHCG220J-T
C038,040	*9A03222300	C.,CHIP TI-2INIEF104Z-T
C041	*9A03222400	C.,CHIP TI-3IPICE105M-T
CN100	*9A03243100	CONNECTOR,18P 53020-1810
CN101	*9A03238600	PCB CONNECTOR,B6B-ZR
D001	*9A03241900	CHIP DIODE,MA157A-(TX)
DE001	*9A03241600	C.,CHIP TANTAL ECST0JB475R
DE002	*9A03241700	C.,CHIP ELEC MF6.3FC22
DE003	*9A03241800	C.,CHIP TANTAL ECST0JC106R

PRE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
DE004,005	*9A03241700	C.,CHIP ELEC MF6.3FC22
IC001	*9A03240800	IC.,HA1185MP-EL
IC002	*9A03221400	IC.,UPD74HC02G-T1
IC003	*9A03240900	IC.,HA12109AMP-EL
L001,003	*9A03242000	CHIP INDUCTOR,ELJ-FA4R7KF
R001	*9A03232600	R.,CHIP MCR10EZHJ333
R002,003	*9A03242100	R.,CHIP MCR10EZHJ272
R004	*9A03232600	R.,CHIP MCR10EZHJ333
R005,006	*9A03229700	R.,CHIP MCR10EZHJ822
R007,008	*9A03227700	R.,CHIP MCR10EZHJ472
R009,010	*9A03232600	R.,CHIP MCR10EZHJ333
R011,014	*9A03238300	R.,CHIP MCR10EZHJ391
R015,017	*9A03232600	R.,CHIP MCR10EZHJ333
R018	*9A03232400	R.,CHIP MCR10EZHJ271
R019	*9A03242200	R.,CHIP MCR10EZHJ220
R020	*9A03231800	R.,CHIP MCR10EZHJ152
R021	*9A03230300	R.,CHIP MCR10EZHJ222
R022	*9A03229400	R.,CHIP MCR10EZHJ101
R023	*9A03227800	R.,CHIP MCR10EZHJ102
R024	*9A03240000	R.,CHIP MCR10EZHJ223
R025	*9A03242400	R.,CHIP MCR10EZHJ181
R026	*9A03242500	R.,CHIP RNC1/16E272DTP
R027,028	*9A03232800	R.,CHIP RNC1/16E223DTP
R029	*9A03230300	R.,CHIP MCR10EZHJ222
R031	*9A03238300	R.,CHIP MCR10EZHJ391
R032	*9A03240600	R.,CHIP MCR10EZHJ471
R033	*9A03231800	R.,CHIP MCR10EZHJ152
R034,035	*9A03227700	R.,CHIP MCR10EZHJ472
R036,037	*9A03231700	R.,CHIP MCR10EZHJ332
R038,039	*9A03242600	R.,CHIP MCR10EZHJ912
R040,041	*9A03238300	R.,CHIP MCR10EZHJ391
R042,043	*9A03231800	R.,CHIP MCR10EZHJ152
R044,045	*9A03227800	R.,CHIP MCR10EZHJ102
R046	*9A03242100	R.,CHIP MCR10EZHJ272
R047	*9A03240000	R.,CHIP MCR10EZHJ223
R048	*9A03230300	R.,CHIP MCR10EZHJ222
R049	*9A03231700	R.,CHIP MCR10EZHJ332
R050	*9A03242700	R.,CHIP MCR10EZHJ183
R051	*9A03229500	R.,CHIP MCR10EZHJ473
R052	*9A03240000	R.,CHIP MCR10EZHJ223
R053	*9A03242800	R.,CHIP MCR10EZHJ824
R054	*9A03228100	R.,CHIP MCR10EZHJ273
R057	*9A03231000	R.,CHIP MCR10EZHJ105
R058	*9A03242900	R.,CHIP RNC1/16E471DTP
T001,009	*9A03234900	CHIP TR.,2SD1048X7-TB
T010	*9A03234100	CHIP TR.,2SA1037K-T146R
T011	*9A03235000	CHIP TR.,2SC2412K-T146R
T012	*9A03235200	CHIP TR.,DTC144TK-T146
T013	*9A03234100	CHIP TR.,2SA1037K-T146R
TP100	*9A03243200	TEST PIN,LC-3-S (RED)
VR004	*9A03235300	CHIP VR,SEMI EVM-6PSW00B14
VR005	*9A03243000	CHIP VR,SEMI,EVM-6PSW00B53

Parts marked with *require longer delivery time.

HP PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03330100	HP PCB ASSY,2B-HP3
	*9A03250700	BLANK PCB -SET,R200077B-1
C001	*9A03222600	C.,CHIP TI-21NIEF473Z-T
CN100	*9A03243700	CONNECOTR,PHONE PH-7P-29-R04
DE001,002	*9A03226100	C.,CHIP ELEC MF6.3FC33
IC001	*9A03243300	IC.,NJM4556M-TI
JK100	*9A03243800	JACK,YKB21-5182
R001,002	*9A03243400	R.,CHIP MCR10EZHJ560
R003,004	*9A03228000	R.,CHIP MCR10EZHJ103
R005,006	*9A03243500	R.,CHIP MCR10EZHJ182
R007,008	*9A03228000	R.,CHIP MCR10EZHJ103
R009,010	*9A03230300	R.,CHIP MCR10EZHJ222
T001,002	*9A03234900	CHIP TR.,2SD1048X7-TB
VR100	*9A03243600	VR,RK09K12AL15-10KAX2

EJ PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*9A03330200	EJ PCB ASSY,2B-EJ3
	*9A03250700	BLANK PCB -SET,R200077B-1
SW100	*9A03334300	TACT SWITCH,EVQ-QS205K

INCLUDED ACCESSORIES

REF.NO.	PARTS NO.	DESCRIPTION
	*5740004200	BELT,SHOULDER
	*9A03251300	NI-CD BATTERY,P-10AS15U4B
	*9A03250800	CORD,PIN WRL9221-5015-A
	*5700132600	OWNER'S MANUAL [E]
	*5700132400	OWNER'S MANUAL [J]
	*5700132500	OWNER'S MANUAL [US,E,UK]
	*9A03250900	AC ADAPTOR,AD-D6ET [UK]
	*9A03251000	AC ADAPTOR,AD-D6GT [E]
	*9A03251100	AC ADAPTOR,AD-D6UT [US]
	*9A03251200	AC ADAPTOR,AD-D6JT [J]

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [J]:JAPAN

Parts marked with *require longer delivery time.

DAT MECHANISM

CONTENTS

1. HANDLING PRECAUTIONS 68
   1-1. Whole Mechanism 68
   1-2. Cylindrical Head Drum 68
   1-3. Capstan Motor 68

2. FUNCTION OF EACH MECHANISM 69
   2-1. Tape Loading 69
   2-2. Tape Transport 69
   2-3. Reel Base Drive Mechanism 69
   2-4. Cassette Holding and Ejection Mechanism 69

3. DISASSEMBLY, (ASSEMBLY), ADJUSTMENT
   3-1. Disassembly 70
   3-2. Disassembling the Base Mechanical Unit 72
   3-3. Disassembling the Sub-chassis Unit 74
   3-4. Disassembling the Loading Gear Unit 76
   3-5. Disassembling the Cassette Holder 78

4. ADJUSTMENT
   4-1. Back Tension Torque Adjustment 80

1. HANDLING PRECAUTIONS

1-1. Whole Mechanism

(1) To life the mechanism, hold the PCBs on both sides gently, Do not hold the Casette Holder as it may be deformed. When placing the mechanism, put it up side down.

(2) Do not touch the Cylinderical Head Drum with naked hand.

(3) Do not pile up the mechanisms.

(4) Never touch the connector terminals of FPC with naked hand.

(5) Do not cary or lift the mechanism by holding FPC or wires.

(6) Never touch or scratch the Guide Rollers.

To clean the Guide Rollers, soak a cotton stick in Daiflon Solvent and rub themgently.

(7) Do not touch or scratch the Poles.

(8) Never touch Pinch Roller, Belt, or Pulley with oily hands.

1-2. Cylindrical Head Drum

(1) Do not touch the drum, moisture (DEW) sensor, and FPC terminal.

(2) Hold the base to carry the part.

(3) Put the Cylindrical Head Drum on a soft material so that the drum and the rotor do not suffer by the shock.

(4) Never lift or carry the part by holding the FPC.

(5) Do not bend or pull the FPC.

(6) Do not perform soldering work near Cylindrical Head Drum.

(7) Never apply a pressure on the upper drum.

1-3. Capstan Motor

(1) Never touch the rotor with metallic objects such as screw drivers or tweezers. Keep magnetized material away from the rotor.

(2) Do not place Capstan Motors closely.

(3) Do not touch the FG Sensor.

(4) Never lift Capstan Motor by holding the FPC connector.

2. FUNCTION OF EACH MECHANISM

The DAT mechanism is designed for portable type and, is composed of Tape Loading mechanism, Tape Transport Poles, Reel Driving mechanism, Cassette Holder mechanism.

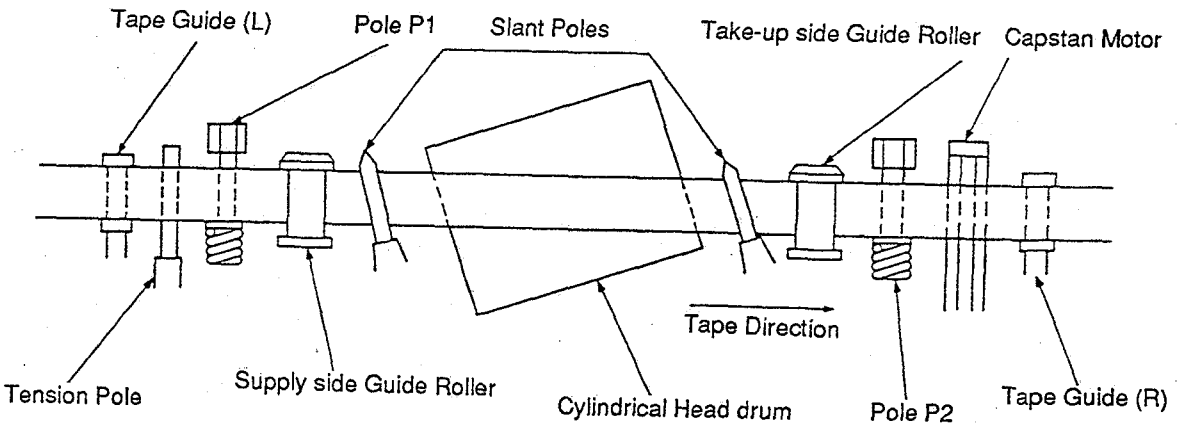
The following are functions of each block.

2-1. Tape Loading

Extracting the tape from the cassette, wrapping it about the cylindrical head drum at a precisely defined angle, are performed by one DC motor. Control of the motor is done by Mode Sensor Switch.

2-2. Tape Transport

The mechanism is made up with nine poles, cylindrical head drum, and capstan as shown below.



The tape is guided by those poles and transported by the rotation of capstan.

2-3. Reel Base Drive Mechanism

The reel is turned by the capstan motor through a belt. The turning force to the rewind reel and supply reel is switched on and off by sliding the idler gear to the right and left by a small DC motor, by which the idler gear meshes with the reel base.

The positioning of the idler gear and the control of the small-sized DC motor are done by the mode sensor switch.

2-4. Cassette Holding and Ejection Mechanism

The cassette holder is made up of a holder and a lift. The holder opens and closes the cassette slider and provides a stable cassette holding pressure.

The lift employs an eject damper and thus, the cassette can be lightly ejected. Also, it has a locking mechanism of the holder.

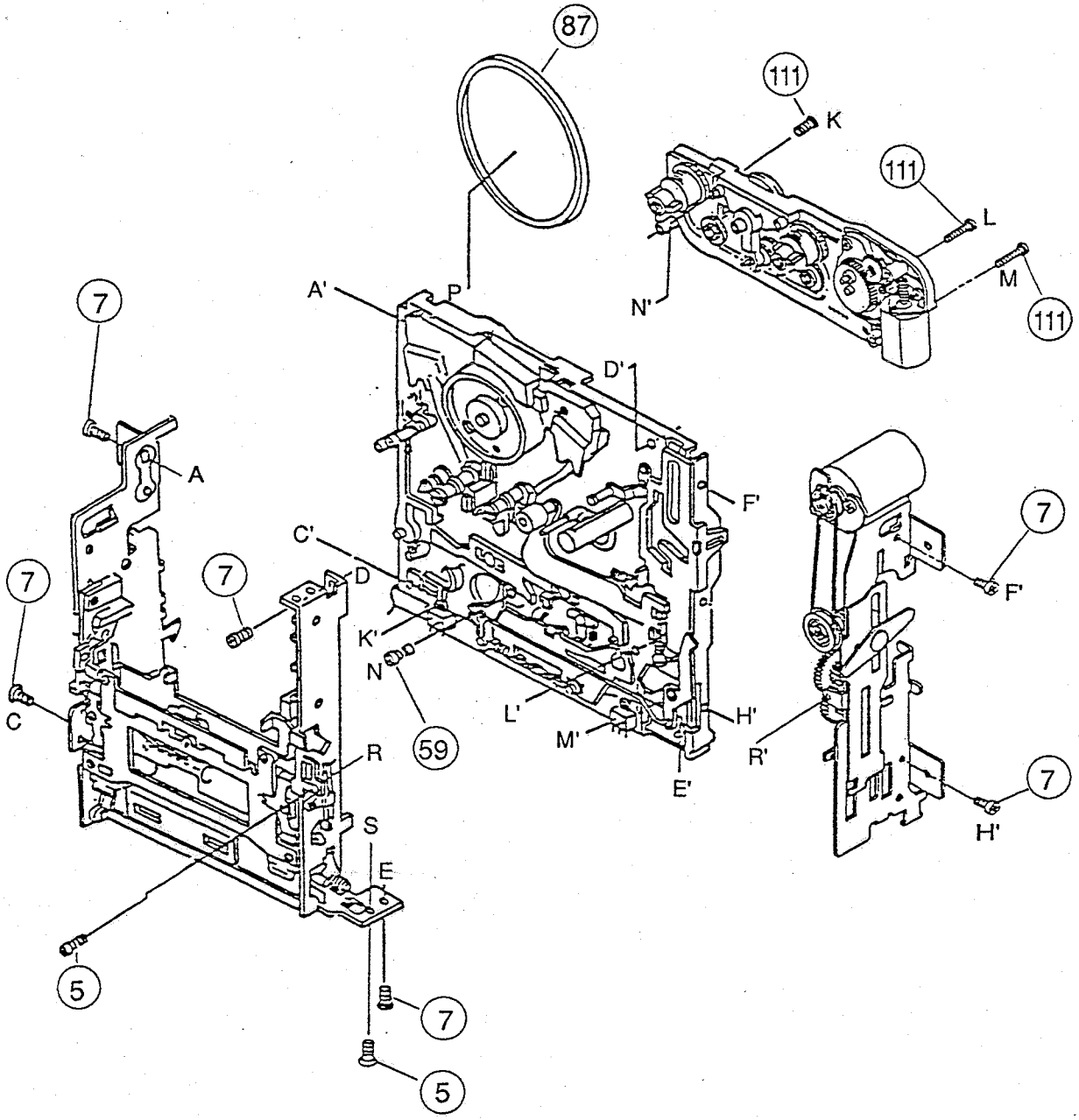
The locking mechanism of the holder is operated by a DC motor in the same manner as in "1-1. Tape Loading Mechanism."

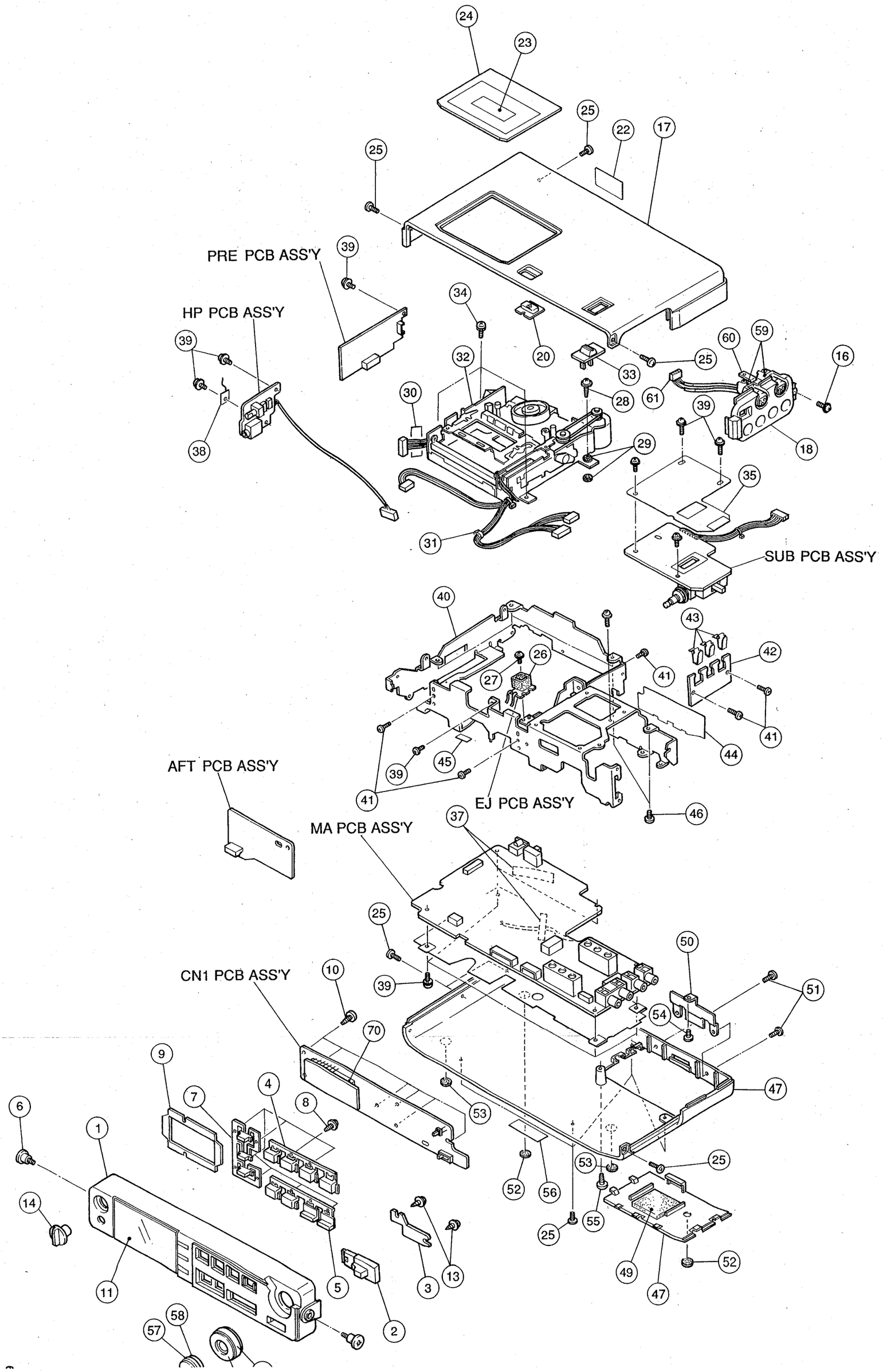
3. DISASSEMBLY, (ASSEMBLY), ADJUSTMENT

3-1. Disassembly

The main block can be disassembled into the following units; the base mechanism, sub-chassis, loading gears, and the cassette holder.

[Exploded View]




PRE PCB ASS'Y
HP PCB ASS'Y
AFT PCB ASS'Y
MA PCB ASS'Y
CN1 PCB ASS'Y
EJ PCB ASS'Y
SUB PCB ASS'Y
24
23
25
22
17
25
39
34
20
33
25
60
59
16
61
32
30
28
39
18
29
35
31
38
40
43
42
26
27
41
41
44
45
39
41
46
37
25
39
10
50
51
54
70
9
7
4
8
53
47
6
1
53
25
52
56
55
25
14
49
47
52
11
5
3
13
2
57
58

Disassembled part	Procedure for disassembly	Note
(87) Belt		Use care not to stain the belt with grease, etc.
Sub-chassis unit	(1) Remove 3 screws (111) and the screw (59), and remove the sub-chassis unit.	
Cassette holder unit	(1) Remove the 4 screws (7). (2) Remove the 2 screws (5) and remove the cassette holder unit.	
Loading gear unit	(1) Remove the (7) and remove the loading gear unit.	

Assembly

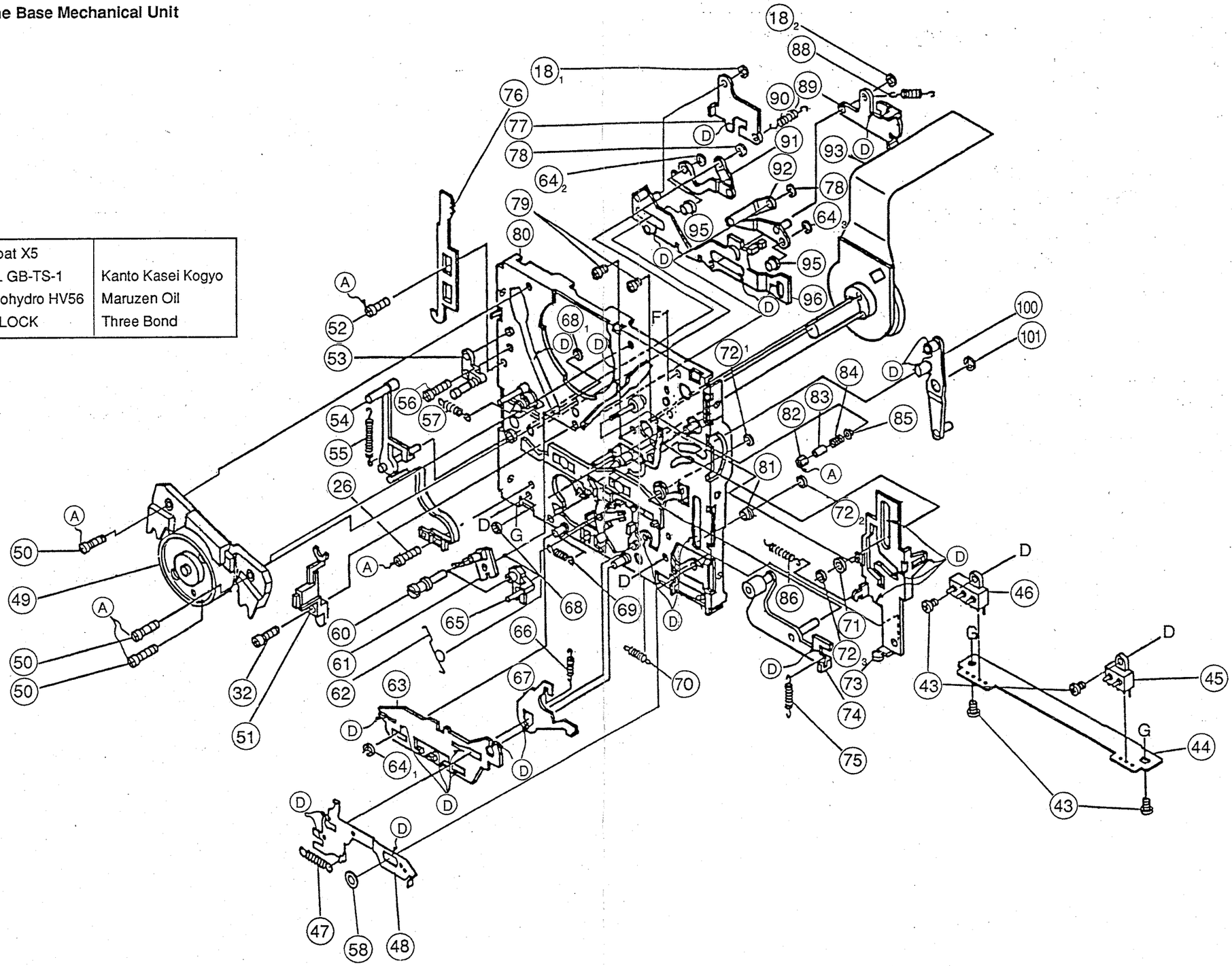
For assembly, reverse the procedure for disassembly.

When handling wires, use care so that binding wires will not cut in chassis, or other metallic parts.

3-2. Disassembling the Base Mechanical Unit

[Exploded View]

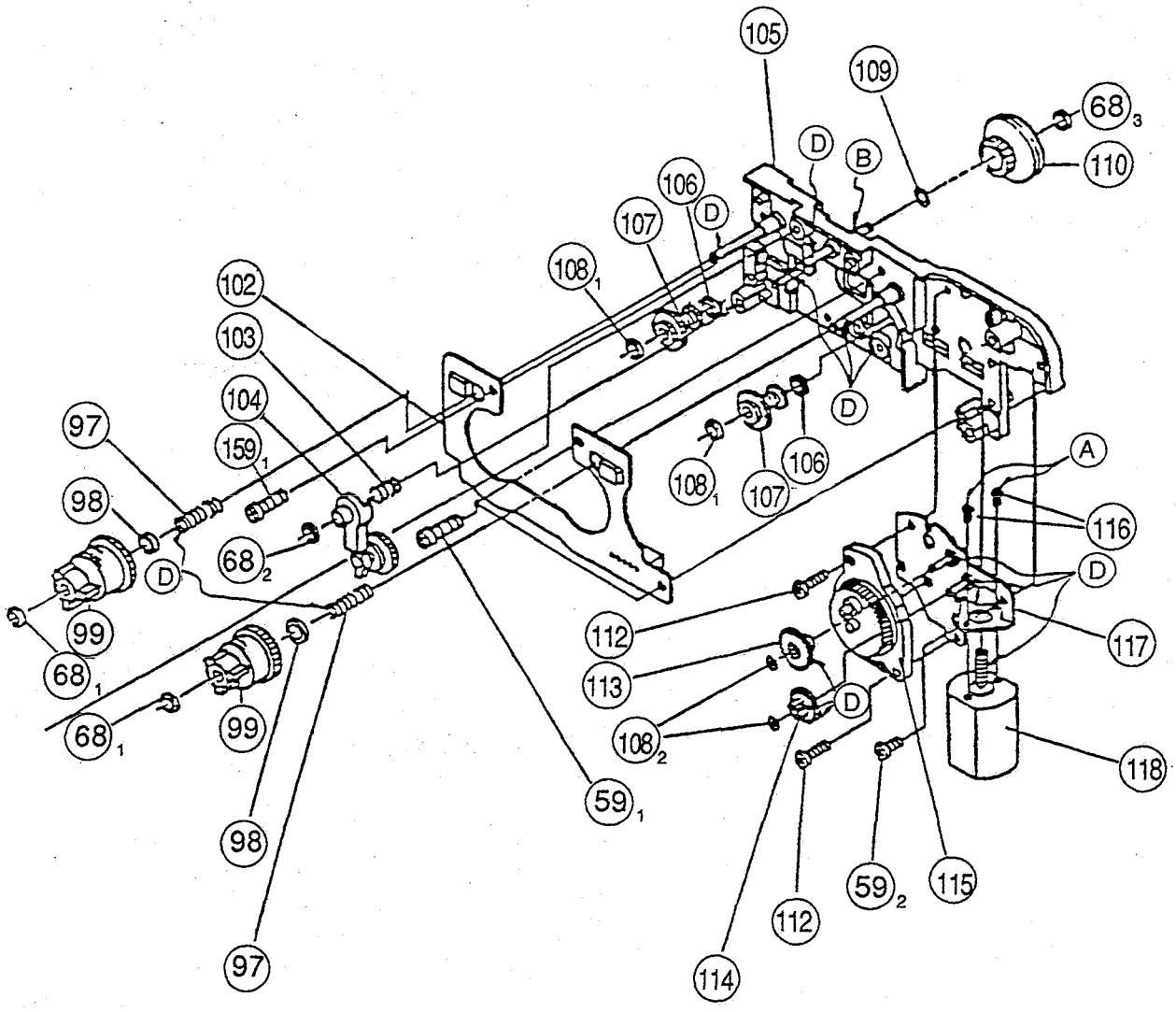
D	Molicoat X5	
C	FLOIL GB-TS-1	Kanto Kasei Kogyo
B	Cosmohydro HV56	Maruzen Oil
A	NEJI-LOCK	Three Bond



Disassembled part	Procedure for disassembly	Note
(49) Cylinder assembly	(1) Remove three screws (50) and remove the cyliner.	• Use care not to scratch the cylinder. • When installing the cylinder assembly, keep the tightening torque less than 1 kg cm.
(93) Capstan motor	(1) Remove three screws (79) and remove the capstan motor.	• When installing the capstan motor, keep the tightening torque less than 1 kg-cm.
(74) Pin roller assembly	(1) Remove the P roller spring (75). (2) Remove the washer $(72)_1$, and remove the pinch roller assembly (74).	• Use care not to scratch the contact surface of the roller with the tape.
(54) Tension arm assembly	(1) Remove the spring (55). (2) Remove the screw (26). (3) Remove the washer $(68)_1$, and remove the tension arm assembly.	• Use care not to scratch the tension band. • Use care not to stain the tension band felt with grease. • Use care not to scratch the post. • Use care not to distort the tension arm assembly.
(53) P_1 guide assembly	(1) Remove the screw (56), and remove the P_1 guide assembly.	• Use care not to scratch the contact surface of the post tape with the roller.
(61) IC Base assembly (65) IC Base assembly	(1) Remove the E-clip (78) and remove the IC base assemblies L and R.	• Use care not to scratch the contact surface of the post tape with the roller.
(73) Cam plate assembly	(1) Remove the washers $(72)_2$ and $(72)_3$, remove the rollers (71) and (81), then remove the camplate assembly.	
(67) SP Metal	(1) Remove the spring (47) and washer (58), and remove the release lever (48). (2) Remove the E-clip $(64)_1$. (3) Remove the slides F/R (63). (4) Remove the lock spring (66). (5) Remove the SP metal (67).	
(96) Side plate supporter	(1) Remoe the TG-L spring L (57). (2) Remove LODG spring L (90) and LODG spring R (88). (3) Remove the E-rings $(18)_1$ and $(18)_2$, plate SPG (1) (77) and plate SPG (2) (89). (4) Remove E-clips $(64)_2$ and $(64)_3$, remove the two rollers (95) and guide plate supporters (91) and (92).	• Use care not to deform the spring.

3-3. Disassembling the Sub-chassis Unit

[Exploded View]



D	Molycoat X5	
C	FLOIL GB-TS-1	Kanto Kasei Kogyo
B	Cosmohydro HV56	Maruzen Oil
A	NEJI-LOCK	Three Bond

Disassembled part	Procedure for disassembly	Note
(99) Two reel assemblies	(1) Remove the two washers (68)$_1$. (2) Remove the two reel assemblies (99). (3) Remove the two luminaries (98). (4) Remove the two BT springs (97).	• Use care not to stain the reel assembly reflector with grease.
(107)TU assembly	(1) Remove the two washers (108)$_1$. (2) Remove the TU assemblies (107). (3) Remove the two polysliders (106).	
(102)Sensor assembly	(1) Remove the three screws (59)$_1$, and remove the sensor assembly.	
(115)Switch assembly	(1) Remove the two washers (108)$_2$. (2) Remove the intermediate gear (113) and worm wheel (114). (3) Remove the two screws (112), and remove the switch assembly (115).	
(118)Motor supporter	(1) Remove the two washers (59)$_2$, and remove the motor bracket (117). (2) Remove the two screws (116), and remove the motor suporter (118).	
(110)Center pulley	(1) Remove the washer (68)$_3$, and remove the pulley (110).	
(104)ID gear ass'y	(1) Remove the washer (68)$_2$, and remove the ID gear ass'y (104). (2) Remove the sensor SP (103).	• Use care not to scratch gears.

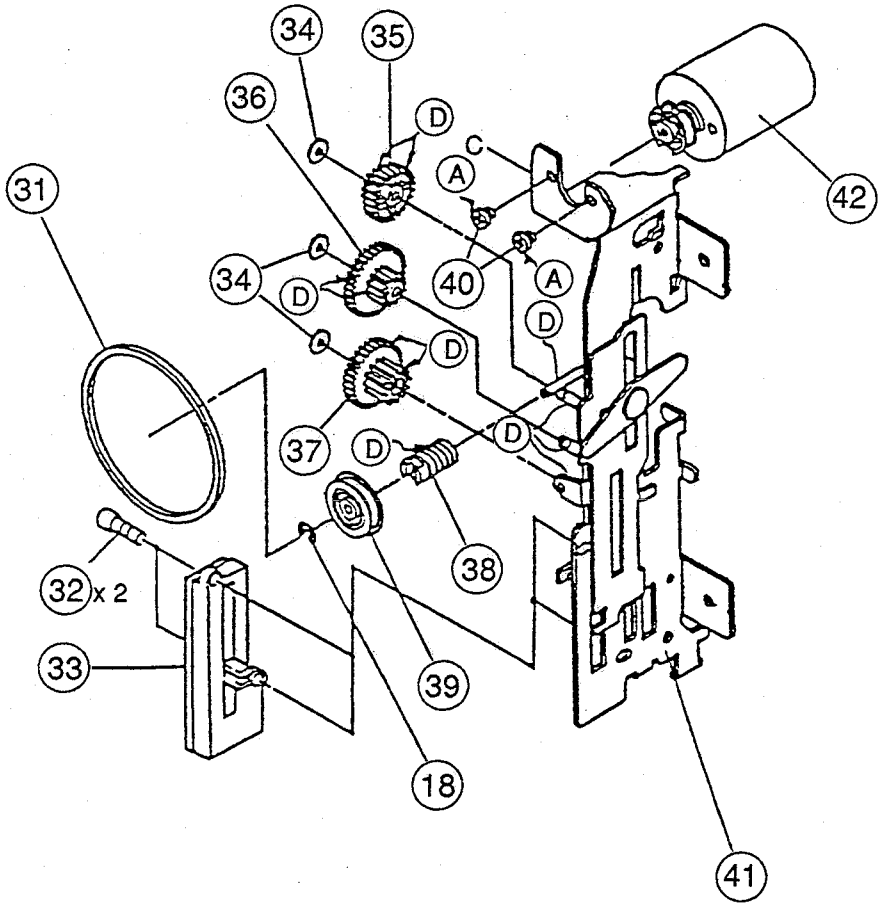
Assembly

For assembly, reverse the procedure for disassembly.

Always use new E-rings and washers.

3-4. Disassembling the Loading Gear Unit

[Exploded View]



D	Molycoat X5	
C	FLOIL GB-TS-1	Kanto Kasei Kogyo
B	Cosmohydro HV56	Maruzen Oil
A	NEJI-LOCK	Three Bond

Disassembled part	Procedure for disassembly	Note
㉛ LDG belt		• Use care not to stain the belt with grease, etc.
㊷ Motor supporter	(1) Remove the two screws ㊵, and remove the motor supporter ㊷.	
㉟ ㊱ ㊲ Gear	(1) Remove the washer ㉞, and remove the gears ㉟, ㊱, and ㊲.	• Use care so that no substance sticks to any gear tooth top. • Use care not scratch gears.
㊳ Worm ㊴ Pulley worm	(1) Remove the washer ⑱, and remove the pulley worm ㊴ and worm ㊳.	• Use care not to allow any substanced to stick to worm tooth top. • Use care not to scratch any warm tooth top.
㉝ Mode switch (T)	(1) Remove the two screws ㉜, and remove the mode sensor switch (T).	

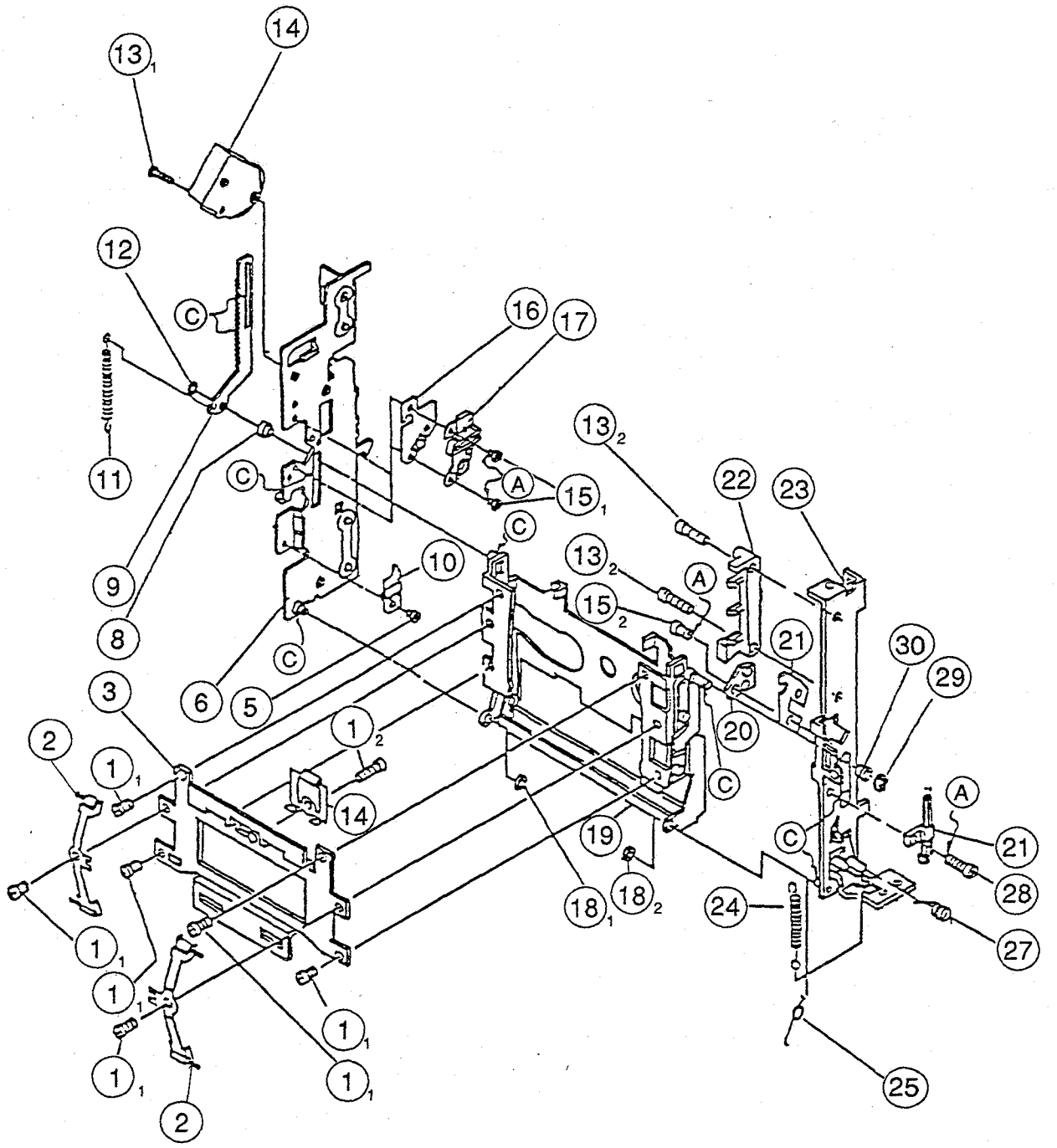
Assembly

For assembly, reverse the procedure for disassembly.

Always use new E-rings and washers.

3-5. Disassembling the Cassette Holder

[Exploded View]



D	Molycoat X5	
C	FLOIL GB-TS-1	Kanto Kasei Kogyo
B	Cosmohydro HV56	Maruzen Oil
A	NEJI-LOCK	Three Bond

Disassembled part	Procedure for disassembly	Note
⑥ Holding plate support	(2) Remove the holder SP(L) ⑪. (1) Remove the E-clip ⑱$_1$, washer ⑫, and collar link ⑧, and then, remove the plate side assembly block. (3) Remove the screw ⑬$_1$, and remove the damper ⑭. (4) Remove nine rack dampers. (5) Remove the two screws ⑮$_1$, and remove the sensor assembly ⑯ and sensor cover L ⑰.	• Use care not to distort the sensor. • Use care not to scratch gear teeth.
㉓ Holding plate support	(1) Remove the holder SP ㉔. (2) Remove the E-clip ⑱$_2$, E-clip ㉙, and collar link ㉚, and remove the holding plate support block. (3) Remove the lock spring ㉗. (4) Remove the screw ㉘, and remove the leaf switch of the sensor assembly ㉑. (5) Remove the spring ⑮$_2$, and remove the sensor cover ⑳ and the sensor assembly ㉑. (6) Remove the screw ⑬$_2$, and remove the lead opener ㉒.	• Use care not distort the sensor. • Use care not to stain leaf switch contacts or not allow any foreign matter to stick to it. • Use care not to deform the lead switch.
② Plate holder	(1) Remove the six screws ①$_1$, remove the two cassette holder supports ②, and remove the plate holder ③. (2) Remove the screw ①$_2$, and remove the cassette holder support ④.	• Use care not to deform the spring.

Assembly

For assembly, reverse the procedure for disassembly.

Always use new E-rings and washers.

4. ADJUSTMENT

4-1. Back Tension Torque Adjustment

Procedure for adjustment	Remarks
1. Once loosen the screw holding the guide roller, and again lightly tighten.	Make sure the guide roller turns with little resistance. (Fig. 1)
2. Using the height adjustment jig, adjust the lower limit of P_1 and P_2 posts and the upper limit of the guide rollers, R and L.	Use height adjusting hexagon socket head wrench, double-ended wrench. (Fig. 2)
3. Move molded part A to right and left so that the tension post is positioned in the play mode as illustrated, and tighten the screw.	(Fig. 3)
4. Using SONY torque measuring tape TW7111 in the REC PLAY mode, pull or loosen the spring with pressed tool B so that the back tension torque is 6.5 ~ 8.5 gcm at center.	(Fig. 4)
5. Tighten the screw of pressed product B.	(Fig. 4)
6. When it is impossible to set the back tension torque to 6.5 ~ 8.5 gcm by pulling or loosening the spring, move the molded tool A to the right and left, and make an adjujstment by pulling and loosening the spring again with pressed product B.	Make sure that P_1 post, tension post, TG, and R are all taped.
7. Apply NEJI-LOCK to the threaded portions of the molded product and pressed product B.	

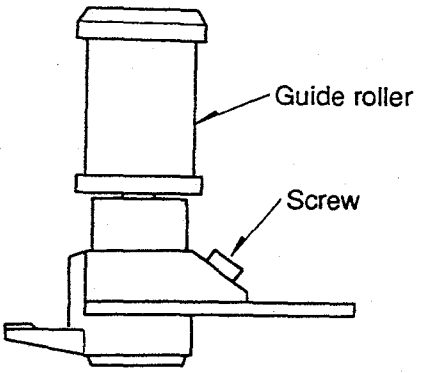


Fig. 1

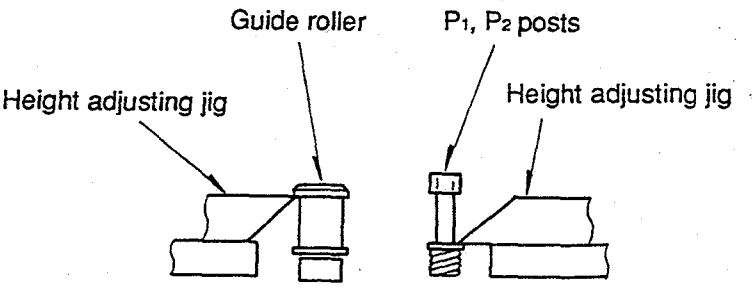


Fig. 2

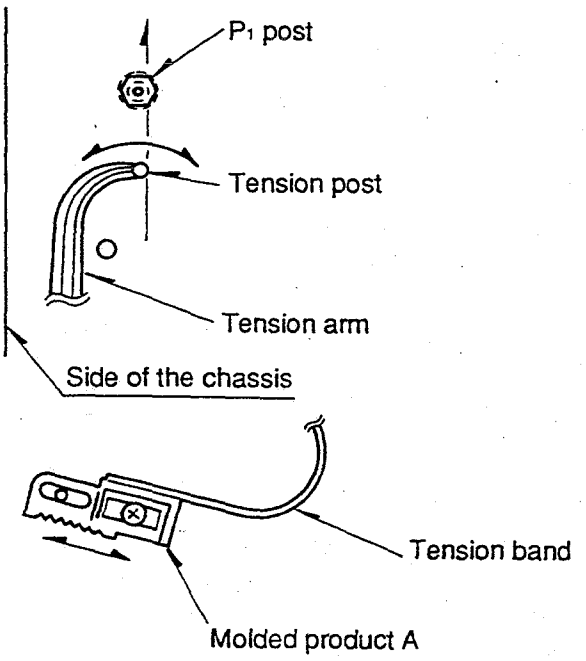


Fig. 3

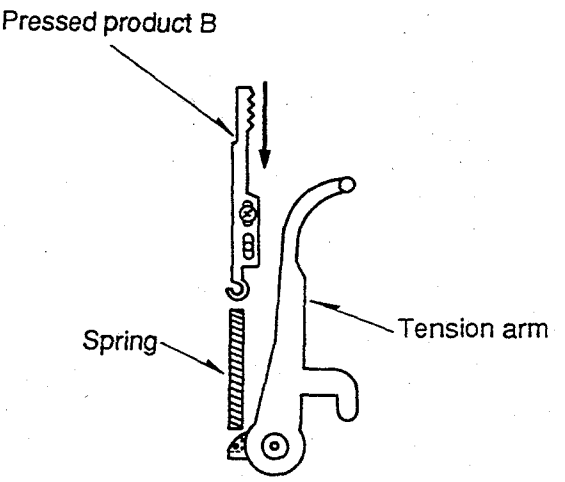
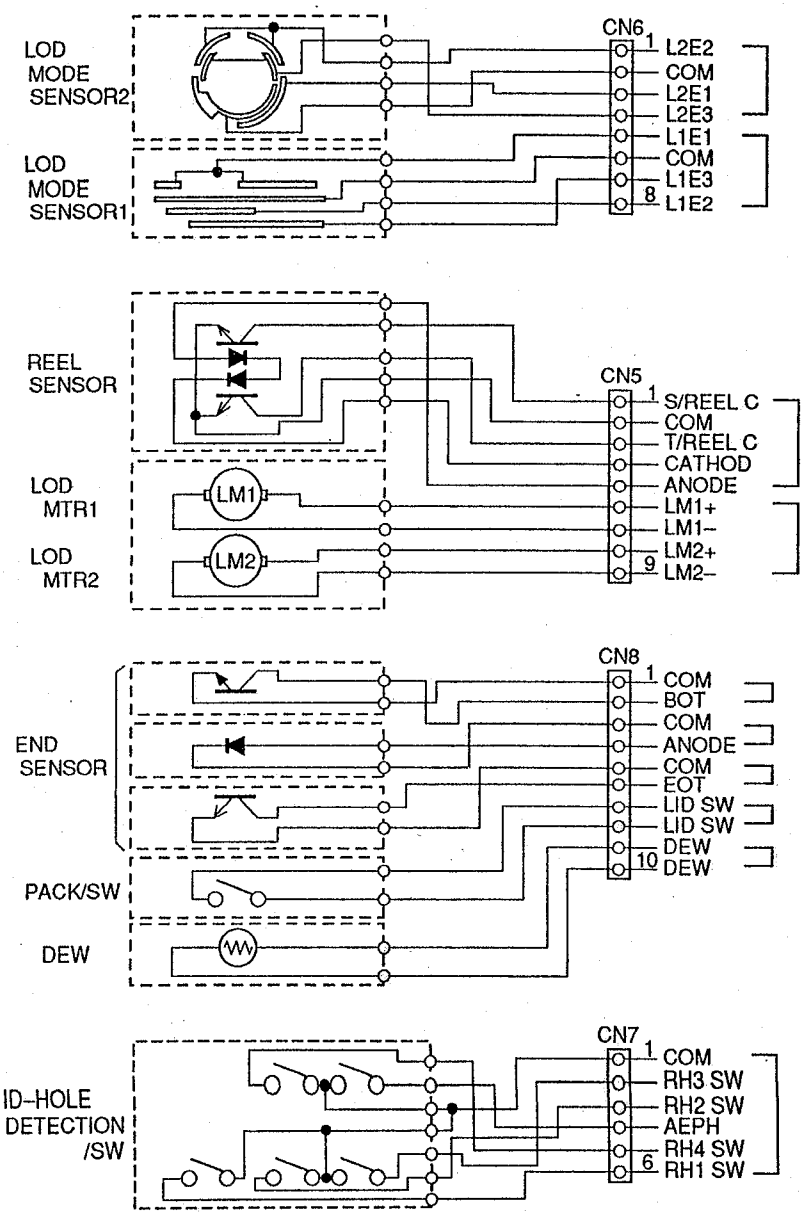
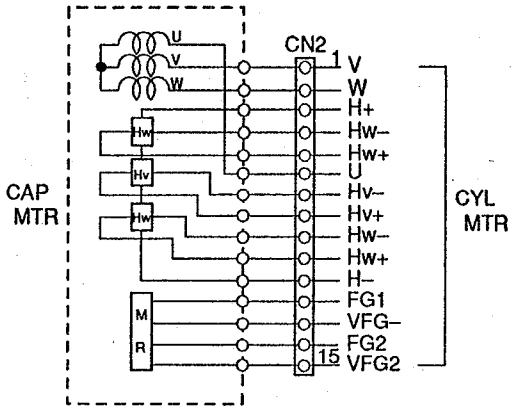


Fig. 4

CN5, 6, 7, 8 PIN ASSIGN



CN4 PIN ASSIGN



Note: The pitch between terminals of CN4 should be 1.25 mm FPC.

CN2, 3 PIN ASSIGN